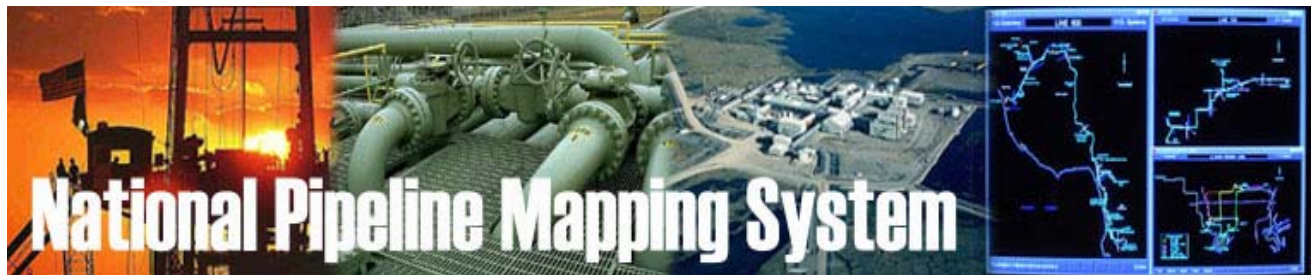


National **P**ipeline **M**apping **S**ystem

Standards for

Pipeline, Liquefied Natural Gas and Breakout Tank Farm Operator Submissions

January 2003



Research and Special Programs Administration

Office of Pipeline Safety

www.npms.rspa.dot.gov



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List of Acronyms

AA	Anhydrous Ammonia
AGA	American Gas Association
API.....	American Petroleum Institute
ASCII.....	American Standard Code for Information Interchange
BTS.....	Bureau of Transportation Statistics, U.S. Department of Transportation
CAD.....	Computer-Aided Drafting
CADD.....	Computer-Aided Drafting and Design
CO ₂	Carbon Dioxide
CRD	Crude Oil
DLG.....	Digital Line Graph
DOE.....	Department of Energy
DOS	Disk Operating System
DRG.....	Digital Raster Graphic
DXF	Drawing Exchange Format
EMT.....	Empty
FERC	Federal Energy Regulatory Commission
FGDC	Federal Geographic Data Committee
FTP site.....	File Transfer Protocol site
GIS.....	Geographic Information System
GPS.....	Global Positioning System
HG	Hydrogen Gas
HVL.....	Highly Volatile Liquid
INGAA	Interstate Natural Gas Association of America
LNG.....	Liquefied Natural Gas
LPG	Liquefied Petroleum Gas
LUT	Look-Up-Table
MIF	MapInfo Interchange File
MQAT	Joint Government-Industry Pipeline Mapping Quality Action Team
NAD 27, 83	North American Datum (of 1927 or 1983)
NG	Natural Gas
NGL.....	Natural Gas Liquids
NPMS	National Pipeline Mapping System
OMB	Office of Management and Budget
OPS.....	Office of Pipeline Safety, U.S. Department of Transportation
PRD	Product
ROW.....	Right-Of-Way
SEF	Standard Exchange Format
SMYS	Specified Minimum Yield Strength
USDOT.....	U.S. Department of Transportation
USGS.....	United States Geological Survey
UTM	Universal Transverse Mercator

Preface

This document was prepared by the second Joint Government/Industry Pipeline Mapping Quality Action Team (MQAT II). The team was sponsored by the U.S. Department of Transportation (USDOT) Office of Pipeline Safety (OPS), American Petroleum Institute (API), American Gas Association (AGA), and Interstate Natural Gas Association of America (INGAA). Representatives on the team included OPS, Bureau of Transportation Statistics (BTS), U.S. Department of Energy (USDOE), U.S. Geological Survey (USGS), Federal Energy Regulatory Commission (FERC), state representatives from California, Louisiana, New York, and Texas, and representatives from the pipeline industry.

If you have questions regarding this document, please contact one of the following representatives:

OPS Contacts

Steve Fischer

GIS Manager

U.S. Department of Transportation
Office of Pipeline Safety
400 7th Street SW
Washington, DC 20590
202-366-6267 • *fax* 202-366-4566
steven.fischer@rspa.dot.gov

Samuel Hall

GIS Analyst

U.S. Department of Transportation
Office of Pipeline Safety
400 7th Street SW
Washington, DC 20590
202-493-0591 • *fax* 202-366-4566
samuel.hall@rspa.dot.gov

**For questions regarding OPS
Operator ID (OPS_ID) information,
contact:**

Lisa Kokoszka

Management and Program Analyst

U.S. Department of Transportation
Office of Pipeline Safety
400 7th Street SW
Washington, DC 20590
202-366-4554
lisa.kokoszka@rspa.dot.gov

National Repository Contacts

Ronnie Buzzard

Project Manager

NPMS National Repository

Michael Baker Jr., Inc.

3601 Eisenhower Avenue

Alexandria, VA 22304

703-317-6205 • fax 703-960-9125

npms-nr@mbakercorp.com

Amy Nelson

GIS Analyst

NPMS National Repository

Michael Baker Jr., Inc.

3601 Eisenhower Avenue

Alexandria, VA 22304

703-317-6294 • fax 703-960-9125

npms-nr@mbakercorp.com

Internet Addresses

National Pipeline Mapping System – www.npms.rspa.dot.gov

Bureau of Transportation Statistics – www.bts.gov

Federal Energy Regulatory Commission – www.ferc.fed.us

Federal Geographic Data Committee – www.fgdc.gov

Office of Pipeline Safety – <http://ops.dot.gov>

Research and Special Programs Administration – www.rspa.dot.gov

U.S. Department of Energy – www.energy.gov

U.S. Department of Transportation – www.dot.gov

U.S. Geological Survey – www.usgs.gov

1. Introduction

The U.S. Department of Transportation (USDOT), Research and Special Programs Administration (RSPA), Office of Pipeline Safety (OPS) has been working with Federal and state agencies and the pipeline industry to create the National Pipeline Mapping System (NPMS). The NPMS is a fully-functional geographic information system (GIS). The system contains the location and selected attributes of **natural gas transmission lines, hazardous liquid trunklines, liquefied natural gas (LNG) facilities, and breakout tank farms** operating in the United States, including offshore. The NPMS also contains pipeline operator contact information. The NPMS is also accepting voluntary data submissions for breakout tanks under OPS jurisdiction. Tank submissions are discussed in Section 7. At this time, OPS does not plan to collect data on service lines, distribution lines, gathering lines, flow lines, or spur lines.

OPS will work with other governmental agencies and private organizations to add other relevant data layers to the system. These include layers on natural disaster probability areas, high consequence areas, hydrography, and transportation networks. OPS will use the system to 1) depict pipelines in relation to the public and national resources, 2) coordinate information with other governmental agencies, 3) provide regulatory oversight, 4) better prepare for a possible pipeline release, 5) work with governmental agencies and private industries in the event of a release.

The NPMS is built and maintained using information supplied by firms that operate pipeline and LNG facilities. Operators are asked to provide contact information and three types of data: geospatial data, attribute data, and metadata.

1.1 Regulatory Requirements

The Pipeline Safety Improvement Act of 2002 requires that pipeline operators provide to the Secretary of Transportation the following information. **The Secretary of Transportation is utilizing the National Pipeline Mapping System National Repository to handle all pipeline data.**

- ◆ Data appropriate for use in the National Pipeline Mapping System (NPMS). A complete data submission includes the geospatial data, attribute data, and metadata for all LNG, hazardous liquid, and natural gas transmission pipeline operation systems operated by a company.
- ◆ The name and address of the person with primary operational control to be identified as its operator.
- ◆ A means for a member of the public to contact the operator for additional information about the pipeline facilities it operates. (OPS is developing a public application that will address this requirement.)
- ◆ Updates of the above information to reflect changes in pipeline facilities.

Data updates and data accuracy verification are discussed further in section 1.4.

It is requested that the data have a **minimal** positional accuracy of ± 500 feet of its known geographic location. Research indicates that most operators can easily achieve ± 500 foot accuracy with current in-house data records.

1.2 Development of NPMS and Standards for Data Submission

A Joint Government/Industry Pipeline Mapping Quality Action Team (MQAT II) was formed to work with OPS on creating the digital pipeline location and attribute layer of the NPMS. The team was sponsored by OPS, American Petroleum Institute (API), American Gas Association (AGA), and Interstate Natural Gas Association of America (INGAA), and included representatives from multiple federal and state governmental agencies, and the natural gas and hazardous liquid pipeline industry.

MQAT II drafted standards and incorporated appropriate recommendations from outside entities, including comments from mapping vendors, pipeline operators, and state agencies outside the MQAT II. The standards underwent two pilot tests. These tests helped to determine the

- ◆ ability of pipeline operators to submit data that meet the standards,
- ◆ problems they encountered while trying to meet the standards,
- ◆ cost and effort required to meet the standards,
- ◆ usability of data formats other than those in the standards, and
- ◆ ability of the pilot repositories to process the submitted data based on the draft standards.

To the greatest extent possible, MQAT II resolved the problems encountered in both pilot tests in an effort to further minimize the time and effort required to meet the standards. The majority of the operators and repositories that participated in the pilot tests stated that the standards were clear and could be met without an undue burden on their company.

Various state agencies currently request or require that operators submit pipeline and LNG data to them. Some state agencies are using the operators' data to create a digital pipeline and LNG layer for their state. NPMS does not supercede or replace state regulations. Operators must still comply with all applicable state regulations.

1.3 NPMS Structure

The NPMS consists of a National Repository ("Repository"), which serves as the final processing and storage facility for all pipeline data. A number of State Repositories formerly existed, but were dissolved in 2002. All data passes through a final series of quality control checks before the data is made available to users. The Repository produces a random sampling of check plots after incorporating the operator's geospatial data and attribute data into the Repository. These check plots are returned to the operator for review as part of the quality control process.

1.4 Data Format, Verification, and Updates

1.4.1. Data Format

The Repository prefers to work with digital data if it is available.

1.4.2. Verifying Accuracy of Previous Data Submittals

After sending a submission to the Repository, the operator must review the submission data on a yearly basis and make a decision about whether the data is still current. "Current" is defined as a condition in which less than five percent of the pipeline mileage has changed. Please note that changes may occur for

either the pipeline location or pipeline attributes. For example, if the commodity carried has been changed for more than five percent of the total pipeline mileage, the data is **not** considered current.

Data Updates in 2003

If a complete data submission was made to the NPMS prior to December 17, 2001 and any pipeline system modifications have occurred since the last submission, submit complete data to the NPMS by **June 17, 2003**. If a complete data submission was made to the NPMS prior to December 17, 2001 and no pipeline system modifications have occurred, send an email to opsgis@rspa.dot.gov stating that fact. If a complete data submission was made to the NPMS on or after December 17, 2001 and if pipeline system modifications representing more than 5% of the total system mileage to be submitted to the NPMS have occurred, submit new complete data by June 17, 2003. If changes to the data submitted on or after December 17, 2001 affect less than 5% of the total system mileage submitted to the NPMS, submit an email to opsgis@rspa.dot.gov stating that fact by June 17, 2003. If only a partial data submission was made to the NPMS before or after December 17, 2001, submit complete data to the NPMS by June 17, 2003. For LNG facilities, if any modifications to previously submitted data have occurred, submit new complete data by June 17, 2003. System modifications include pipelines or LNG facilities added or removed from a pipeline system and changes to any of the NPMS attributes (e.g., operator name, system name, commodity status, etc.).

Please note that operators who submit hard-copy maps should submit paper maps for only those portions of a pipeline system that have changed.

Data Updates after 2003

Operators are required to examine their data every twelve months and determine if resubmittal is necessary. If the data is still current by OPS' definition, the operator must send an email of verification to npms-nr@mbakercorp.com. If the data is not current, operators must resubmit the entire pipeline system (for digital submissions) or the affected segment(s) (for paper submissions). If you have any questions about this process, please contact the National Repository at npms-nr@mbakercorp.com.

Please note that operators who submit hard-copy data are not required to submit the complete data set again when making updates. Those operators should submit only maps for the modified segment(s).

1.4.3. Operator Contact Information

All operators must now submit contact information for their pipeline systems. Please see Section 5 for a detailed explanation of the type of information that is required.

1.5 Distribution of NPMS Data

Federal, state, and local governmental agencies and the pipeline industry may access all or portions of the pipeline, LNG, and breakout tank farm layers of the NPMS. Other data layers on high consequence areas, transportation networks, and natural disaster probability areas are being collected from various governmental and private sources, and are available to the extent possible. The data collected for the

NPMS is necessary for regulatory oversight and for monitoring pipeline security. Therefore, public access to the data is limited.

One of the goals of the NPMS is to assist operators in progressing toward a digital mapping environment. Upon request, digital pipeline and LNG facility data will be provided back to the contributing operator at no cost. The format of the digital data will be determined between the receiving operator and the Repository. The Repository may charge a fee for other products and services. The data contained in the NPMS are for reference purposes only and are not to be construed as actual survey-quality data or as a replacement for contacting a one-call center.

1.6 About these Standards

These standards were created with input from the pipeline industry, governmental agencies, and the public. They address the submission of digital and hard-copy pipeline and LNG data to support the development of a reasonably accurate NPMS. Operators are responsible for providing data that complies with these standards.

The goal of OPS is for the NPMS to support operators who want to develop digital geospatial data. Operators who anticipate having difficulty meeting NPMS standards are encouraged to contact the Repository. The Repository will work with the operator and OPS to formulate an acceptable submission.

These standards serve as a guideline for preparing and submitting pipeline and LNG location and attribute data for inclusion in the NPMS Repository. The Repository understands that the availability of pipeline company maps and digital data varies among operators and that there is a need to be flexible when working with the pipeline operators. The Repository will review and approve variations of data submissions from this standard on a case-by-case basis.

The following sections discuss in detail the format, content, and quality of pipeline and LNG facility data that are to be submitted for inclusion into the NPMS. The standards provide guidelines for the submission of both digital and hard copy data. The NPMS prefers that the data provided by the operator be in digital format. If digital data are not available, then hard-copy submissions are acceptable. Three types of data are required: geospatial data (location information), attribute data (descriptive information), and metadata (data about the data). Contact information for the pipeline operator is also required. See Section 5 for more details about contact information.

2. General Requirements (Key Terms and Definitions)

This section establishes general NPMS terms and requirements.

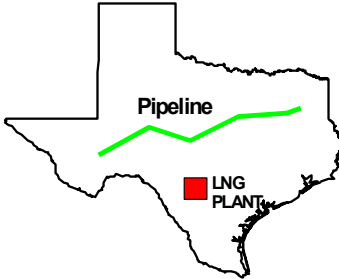
Geospatial Data	Attribute Data	Metadata	Contact Information						
<p>Digital or hard-copy maps with lines and/or points marking the location of pipelines, LNG facilities, and breakout tanks.</p> 	<p>A computer database containing descriptive information about pipelines or LNG facilities. There is one record in the database for each <i>pipeline segment</i>.</p> <table border="1"><thead><tr><th>Pipeline Attribute Table</th></tr></thead><tbody><tr><td>Descriptive Field 1</td></tr><tr><td>Descriptive Field 2</td></tr><tr><td>Descriptive Field ...</td></tr></tbody></table> <table border="1"><thead><tr><th>LNG Attribute Table</th></tr></thead><tbody><tr><td>Descriptive Field 1 ...</td></tr></tbody></table>	Pipeline Attribute Table	Descriptive Field 1	Descriptive Field 2	Descriptive Field ...	LNG Attribute Table	Descriptive Field 1 ...	<p>Descriptive information about how the geospatial and attribute data were prepared (i.e., data about data).</p> <p><i>“This map and database were prepared by ABC Pipeline Company using aerial photography and GPS...”</i></p>	<p>Information about the person or entity who serves as a contact for the pipeline system. Contains either the person’s name and title or the name of an entity. Also contains address, phone, and email information.</p>
Pipeline Attribute Table									
Descriptive Field 1									
Descriptive Field 2									
Descriptive Field ...									
LNG Attribute Table									
Descriptive Field 1 ...									

Figure 2-1. The types of NPMS data.

The NPMS will include natural gas transmission lines, hazardous liquid trunklines, LNG facilities, and breakout tanks. Information on other types of pipelines and facilities need not be submitted at this time.

Natural gas transmission line – A pipeline system, other than a gathering line, that

1. Transports gas from a gathering line or storage facility to a distribution center, storage facility, or large-volume customer that is not downstream from a distribution center. A large-volume customer may receive similar volumes of gas as a distribution center. Factories, power plants, and institutional users of gas are included.
2. Operates at a hoop stress of 20 percent or more of specified minimum yield strength (SMYS) *or*
3. Transports gas within a storage field.

Hazardous liquid – Petroleum, petroleum products, or anhydrous ammonia.

Hazardous liquid trunkline – A hazardous liquid transmission pipeline other than a flow line, gathering line, or in-plant pipeline.

Liquefied natural gas (LNG) – Natural gas or synthetic gas, having methane as its major constituent, that has been changed to a liquid or semi-solid.

LNG facility – A pipeline facility that is used for liquefying or solidifying natural gas or transferring, storing, or vaporizing liquefied natural gas.

Pipeline system – All parts of a natural gas transmission line or hazardous liquid trunkline through which gas or hazardous liquid is transported. By definition, only one firm can operate a pipeline system. Operators should assign unique names to each of their pipeline systems. A pipeline system may have an unlimited number of branches. Each pipeline system must be represented by one or more **pipeline segments**.

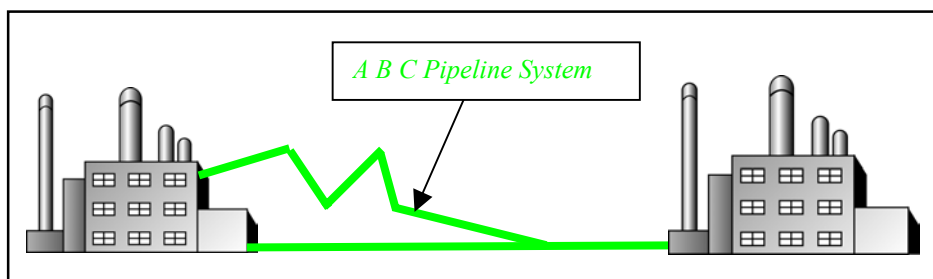


Figure 2-2. Sample of annotated pipeline system.

Pipeline segment – A linear feature representing part or all of a pipeline system on a digital or hard-copy map. A pipeline segment must have only two ends. No branches are allowed. A pipeline segment may be a straight line or may have any number of vertices. Each pipeline segment must be uniquely identified. The number of pipeline segments should be kept to the minimum needed to represent a pipeline system and its associated attributes. When submitting hard-copy maps, the beginning and ending points of each pipeline segment should be marked with a clear, visible dot. When submitting digital geospatial data, a unique line segment in the computer-aided drafting (CAD) or GIS data set should represent each pipeline segment.

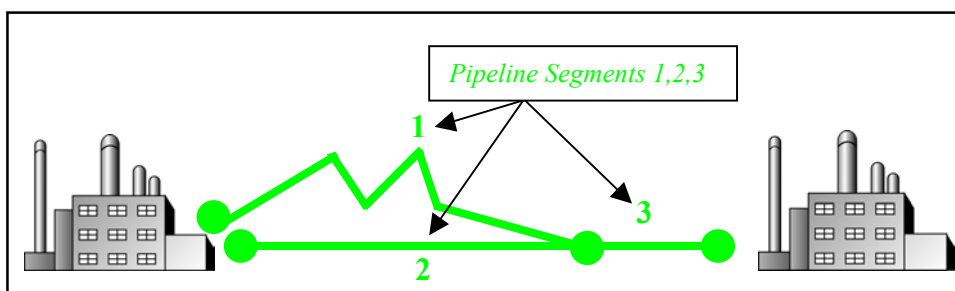


Figure 2-3. A pipeline system consisting of three pipeline segments.

A pipeline system should be broken into multiple pipeline segments for only two reasons:

1. to represent a branch or **intersection** with another pipeline segment, and/or
2. to allow for a change of associated attributes such as diameter.

Pipeline intersection – A point where a physical connection between two pipelines occurs. A commodity from one pipeline can flow into another pipeline(s), either through a branch within a pipeline system or a

connection between two pipeline systems. When submitting hard-copy maps, intersections should be marked with a clear, visible dot. When submitting digital geospatial data, line segments in the CAD or GIS data set should be broken at the point of intersection. The intersection will be a common endpoint (node) representing the two pipeline segments.

Pipeline crossing – A point where two or more pipelines cross, but where there is no physical connection between the pipelines. Pipeline segments should **not** be broken at pipeline crossings. Pipeline crossings should **not** be marked with a dot.

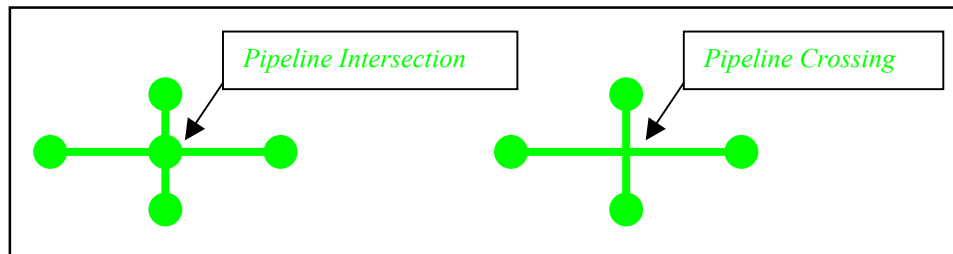


Figure 2-4. Sample annotation of pipeline intersection and pipeline crossing.

Pipeline corridor – A pipeline corridor is a linear area where two or more pipelines (either part of the same or different pipeline systems) are closely grouped in a single right-of-way. Pipeline corridors pose a cartographic challenge and the NPMS handles them differently on hard-copy and digital maps. On hard-copy maps, a single line with multiple annotations may represent the multiple pipelines within a pipeline corridor. In digital files, multiple lines are required, and each separate representation must be stored in individual layers or files. Whether submitting hard-copy or digital geospatial data, pipeline corridors should be clearly annotated, particularly where pipelines join or exit the corridor.

Breakout tank– A tank used to a) relieve surges in a hazardous liquid pipeline system or b) receive and store hazardous liquid transported by a pipeline for reinjection and continued transportation.

2.1 NPMS File Naming Conventions

Operators are requested to use the following formula when assigning file names:

Type of File Code + OPS_ID + hyphen + 4-Digit Sequential Number + 3-Digit Alphanumeric Extension

Sample file name: G12345-0001.DWG

Type of File Code (one-character, alpha):

G = Geospatial Data Only

A = Attribute Data Only

B = Both Geospatial and Attribute Data

(Also use “B” when different geospatial and attribute files should have the same name. For example, an export from ESRI’s ArcView software might have the following names: B12345-0001.SHP, B12345-0001.SHX, B12345-0001.DBF.)

M = Metadata

OPS_ID (five digits [maximum], numeric) – This is the identification number assigned by the Office of Pipeline Safety to pipeline and LNG facility operators, for user-fee purposes. The OPS_ID has five digits or fewer. If you don’t know your OPS_ID, check the NPMS Web site.

4-Digit Sequential Number (one-digit, numeric) – This is used to avoid assigning several files with the same file name.

Extension (three-character default from software package) – Use the default extension for export from the software package (e.g., .DWG, .SHP, .DBF, etc.).

2.2 Types of NPMS Submissions

Operators must classify submissions according to one of the following types. Operators planning to make a submission that combines submission types should contact the Repository prior to preparing the submission. The various types of submissions are intended to facilitate maintenance of the NPMS and minimize the effort required by pipeline operators.

Additions – Additions contain **only** data that is new to the NPMS. All original submissions are additions. All additions should contain geospatial data, attribute data, and metadata. The revision codes (REVIS_CD) of all pipeline segments should be set to “A” for addition.

Modifications – Operators with digital information should submit the entire dataset again when modifications occur. Operators with hard-copy information may include **only** modified data. There are three types of NPMS modifications. Operators should inform the Repository of the type of modification being made.

1. A **geospatial modification** is used if location data or location and attribute are to be modified. All geospatial modifications should contain geospatial data, attribute data, and metadata. The revision

codes (REVIS_CD) of all pipeline segments and/or LNG facilities should be set to “M” for modification or “D” for deletion.

2. An **attribute only modification** is used if modifications only affect pipeline or LNG facility attributes. Attribute only modifications should contain attribute data, metadata, and a letter identifying the affected pipeline systems (SYS_NM) or individual pipeline segments. The revision codes (REVIS_CD) of all pipeline segments and LNG facilities should be set to “M” for modification.
3. A **contact information only modification** is used to report name changes, address changes, or updates to other operator contact information. It is now possible to connect to the NPMS Web site and update the contact information online. The Repository will confirm the changes via email. See Section 5 for more information about updating or entering contact information.
4. A **metadata only modification** is used if modifications only affect metadata. This might include a name change of the technical contact. Metadata only modifications should contain a complete replacement metadata file, and a letter identifying the affected pipeline systems (SYS_NM) or individual pipeline segments.

Change of Operator Report – The operators of any given pipeline system may change frequently. When this occurs, both old and new operators should report the change using the NPMS Web site or send correspondence. The Repository will confirm any changes.

Change Pipeline System Status – If any entire pipeline system operates sporadically or the transported commodities change, NPMS should be notified via the Web site or by correspondence.

3. Attribute Data

When submitting data to the Repository, the operator is required to provide descriptive information about the pipelines and LNG facilities. The attribute data is essential information about the pipeline or LNG facility such as its name and commodity transported. To simplify the submission, the required attribute data has been kept to a minimum.

3.1 Required and Optional Attributes

Each pipeline segment or LNG facility submitted must be accompanied by a corresponding record and attribute database table. For information about required and optional attributes, refer to the following figures:

- ◆ For pipeline submissions, see Figure 3-1 for the attribute field definitions.
- ◆ For LNG submissions, see Figure 3-2 for the attribute field definitions.

3.2 Rules for Attribute Data Input

When submitting digital attribute information, adhere to the following rules:

1. Use only UPPERCASE when defining field names.
2. Use only UPPERCASE when inputting data into the attribute tables.
3. Omit all punctuation except for periods (.), spaces (), backslashes (\), colons (:), commas (,), hyphens (-), and underscores (_). Semicolons (;) should be used only as a delimiter when submitting attribute data in ASCII-delimited text files.
4. Use only NPMS-specified abbreviations.
5. Be consistent. Names and terms should be exactly replicated throughout a submission. For example, if a pipeline system is named Pennsylvania Line (SYS_NM = "Pennsylvania Line"), the operator should consistently use the full and exact name. The operator should not use alternative names like "Penn Line" or "PA Line" or "Pennsylvania."
6. Use the correct OPS_ID. OPS_ID is an accounting number assigned by the U.S. Department of Transportation, Office of Pipeline Safety to firms that operate pipelines and LNG facilities. If you do not know your firm's OPS_ID number, check with your firm's accounting department. A list of valid OPS_ID s is also posted on the NPMS Web site.

Pipeline Attribute Table						
Field Name	Field Type¹	Field Length	Short Description	Full Description	Acceptable Values² (UPPERCASE)	Required Field
OPER_LINK	I	8	Unique Link ID	Link between the geospatial elements (pipeline segments) and their respective attribute records. Assigned by the operator or the operator's software package (i.e., COVER-ID, MSLINK_ID, etc.). Note the OPER_LINK and the PLINE_ID may be identical.	Positive integer	Y
OPS_ID	I	5	Operator Number	Accounting number assigned by OPS to the company that physically operates the pipeline system. If you do not know your firm's OPS_ID, check with your accounting department or the NPMS Web site.	Positive integer	Y
OPER_NM	C	40	Operator Name	The company name that physically operates the pipeline system.	Character	Y
SYS_NM	C	40	System Name	Assigned by the operator. The operator's name for a functional grouping of pipelines.	Character	Y
SUBSYS_NM	C	40	Sub System Name	Assigned by the operator. A unique name for a smaller sub-section of a pipeline system. A subset of SYS_NM.	Character	N ³
PLINE_ID	C	20	Pipeline ID	Assigned by the operator. This is an identifier for a specific section of pipeline within a pipeline system.	Character	Y
DIAMETER	R	5	Diameter	Nominal diameter of the pipeline segment, in inches (two decimal places, ##.##).	Real Number	N ³
COMMODITY1	C	3	Commodity Category 1	Abbreviation for the primary commodity carried by the pipeline system. HG=hydrogen gas, CRD=crude oil, LPG=liquid petroleum gas, NG=natural gas, PRD=product, AA=anhydrous ammonia, CO2=carbon dioxide, NGL=natural gas liquids, HVL=highly volatile liquid, EMT=empty.	HG, CRD, LPG, NG, PRD, AA, CO2, NGL, HVL, EMT	Y
COMMODITY2	C	3	Commodity Category 2	Abbreviation for the secondary commodity carried by the pipeline system. HG=hydrogen gas, CRD=crude oil, LPG=liquid petroleum gas, NG=natural gas, PRD=product, AA=anhydrous ammonia, CO2=carbon dioxide, NGL=natural gas liquids, HVL=highly volatile liquid.	HG, CRD, LPG, NG, PRD, AA, CO2, NGL, HVL	N ³
COMMODITY3	C	3	Commodity Category 3	Abbreviation for the tertiary commodity carried by the pipeline system. HG=hydrogen gas, CRD=crude oil, LPG=liquid petroleum gas, NG=natural gas, PRD=product, AA=anhydrous ammonia, CO2=carbon dioxide, NGL=natural gas liquids, HVL=highly volatile liquid.	HG, CRD, LPG, NG, PRD, AA, CO2, NGL, HVL	N ³
CMDTY_DESC	C	40	Commodity Description	Descriptive information of the commodities carried by the pipeline system. For example, "NATURAL GAS" or "PROPANE."	Character	N ³
INTERSTATE	C	1	Interstate Designation	(Y)es / (N)o designator to identify if the pipeline system is an interstate pipeline. Y=Interstate, N=Intrastate. (Use OPS definition; see glossary).	Y, N	Y
STATUS_CD	C	1	Pipeline Status Code	Identifies the current status of the pipeline segment. I=in service, B=abandoned, R=retired.	I, B, R	Y
QUALITY_CD	C	1	Data Quality Code	Operator's estimate of the positional accuracy of the submitted pipeline segment. E=excellent: within 50 feet, V=very good: 50–300 feet, G=good: 301–500 feet, P=poor: 501–1000 feet, U=Unknown.	E, V, G, P, U	Y
REVIS_CD	C	1	Revision Code	Identifies this pipeline segment as an A=addition to the NPMS, or a M=modification to or D=deletion of a previous submission.	A, M, D	Y
META_NAME	C	12	Metadata File Name	1 Character type of file code + 5 digit OPS_ID + 4 digit file number.	File name	Y
<p>NOTES:</p> <p>1 I – Integer; C – Character; R – Real Number.</p> <p>2 Field must be UPPERCASE.</p> <p>3 N – in the "Required Field" column means that the operator does not have to submit data for that field. However, the operator still needs to include that field in the submitted tables to the Repository.</p> <p>Figure 3-1. Attribute field definitions for pipeline features.</p>						

LNG Facility Attribute Table						
Field Name	Field Type¹	Field Length	Short Description	Full Description	Acceptable Values² (UPPERCASE)	Required Field
OPER_LINK	I	8	Unique Link ID	Link between the geospatial elements (points) and their respective attribute records. Assigned by the operator or the operator's software package (i.e., COVER-ID, MSLINK_ID, etc.). Note the OPER_LINK and the LNG_ID can be identical.	Positive integer	Y
OPS_ID	I	5	Operator Number	Accounting number assigned by OPS to the company that physically operates the LNG facility. If you do not know your firm's OPS_ID, check with your accounting department.	Positive integer	Y
OPER_NM	C	40	Operator Name	The name of the company that physically operates the facility.	Character	Y
LNG_NM	C	40	LNG Facility Name	Assigned by the operator. The operator's name for the LNG facility.	Character	Y
LNG_ID	C	20	LNG Facility ID	Assigned by the operator. This is a unique identifier for a specific facility.	Character	Y
STATUS_CD	C	1	LNG Status Code	Identifies the current status of the facility. I=in service, B=abandoned, R=retired.	I, B, R	Y
QUALITY_CD	C	1	Data Quality Code	Operator's estimate of the positional accuracy of the submitted facility data. E=excellent: within 50 feet, V=very good: 50–300 feet, G=good: 301–500 feet, P=poor: 501–1000 feet, U=Unknown.	E, V, G, P, U	Y
REVIS_CD	C	1	Revision Code	Identifies this facility as A=addition to the NPMS, M=modification to or D=deletion of a previous submission.	A, M, D	Y
META_NAME	C	12	Metadata File Name	1 Character type of file code + 5 digit OPS_ID + 4 digit file number.	File name	Y
NOTES: 1 I – Integer; C – Character. 2 Field must be UPPERCASE.						

Figure 3-2. Attribute field definitions for LNG facilities.

Understanding Pipeline System and Pipeline Segment Attributes

Some NPMS attributes refer to entire pipeline systems, while other attributes may refer only a portion of a pipeline system. For example, the INTERSTATE field obviously refers to the pipeline system as a whole, not its individual pipeline segments. Therefore, the INTERSTATE field must contain the same value for every pipeline segment that is included in a pipeline system. On the other hand, a field such as DIAMETER can change during the course of a pipeline system. In such cases, a new pipeline segment with the appropriate value for DIAMETER must be created.

The following fields must contain the same value for every pipeline segment included in a pipeline system:

- OPS_ID
- OPER_NM
- SYS_NM
- COMMODITY1
- COMMODITY2
- COMMODITY3
- CMDTY_DESC
- INTERSTATE
- META_NAME

Fields that **may** contain a different value for each pipeline segment include:

- OPER_LINK (must be unique for each segment)
- SUB_SYS_NM
- PLINE_ID
- DIAMETER
- STATUS_CD
- REVIS_CD

3.3 Building the Attribute Data File

Attribute data may be provided in one of the following formats: common GIS export, DBASE (.DBF) format, Microsoft Access (.MDB), American Standard Code for Information Interchange (ASCII) text file, or annotation on a hard-copy map. In all cases, operators should be careful to follow the field name, field type, and field length standards listed in Figures 3-1 and 3-2.

The Office of Pipeline Safety has developed an *NPMS Attribute Data Template*. The software operates on Windows personal computers and manages attribute data entry. The software produces properly formatted Microsoft Access files for NPMS submission.

- ◆ **Common GIS export format** – Operators using GIS systems can package attribute data with the associated geospatial data. Acceptable GIS formats are discussed in Section 4.1, General Requirements for Digital Geospatial Data.
- ◆ **DBASE (.DBF) format** – Operators can create a .DBF file using one of the commercially available software packages that writes to a .DBF file. Options include Excel, Access, Fox Pro, Lotus 123, Dbase, and Paradox.

- ◆ **Microsoft Access (.MDB)** – Operators can use the *NPMS Attribute Data Template* to create a properly formatted .MDB file for submission.
- ◆ **ASCII format** – The file should be semicolon-delimited.
- ◆ **Annotation format** – See Section 4.3, Hard-Copy Submissions, for procedures on annotating attributes on hard-copy maps.

3.4 Using The *NPMS Attribute Data Template*

The *NPMS Attribute Data Template* software is available at no cost. The software can be downloaded from the NPMS Web site and is available on CD. The software simplifies the creation of NPMS attribute data by minimizing repetition and handling all formatting issues.

3.4.1 System Requirements

The system requirements are a 486 processor (or higher) personal computer that uses Microsoft Windows 95, 98, 2000, ME, or NT. The system should have at least 8 megabytes of RAM and a CD-ROM drive.

3.4.2 Installation Instructions

Before installing any version of NPMS software, close all open programs. Also, if you are running an older copy of the NPMS software and are attempting to install a new version that will overwrite the existing version, **uninstall the existing NPMS software** before proceeding with these steps.

From CD-ROM:

1. Insert the CD-ROM.
2. From Windows Explorer, double click on Setup.exe.
3. Follow the on-screen installation instructions.

***Note:** The CD-ROM also contains these standards in Adobe Portable Document Format (.PDF) and Adobe Acrobat Reader, which is required to view or print the document.*

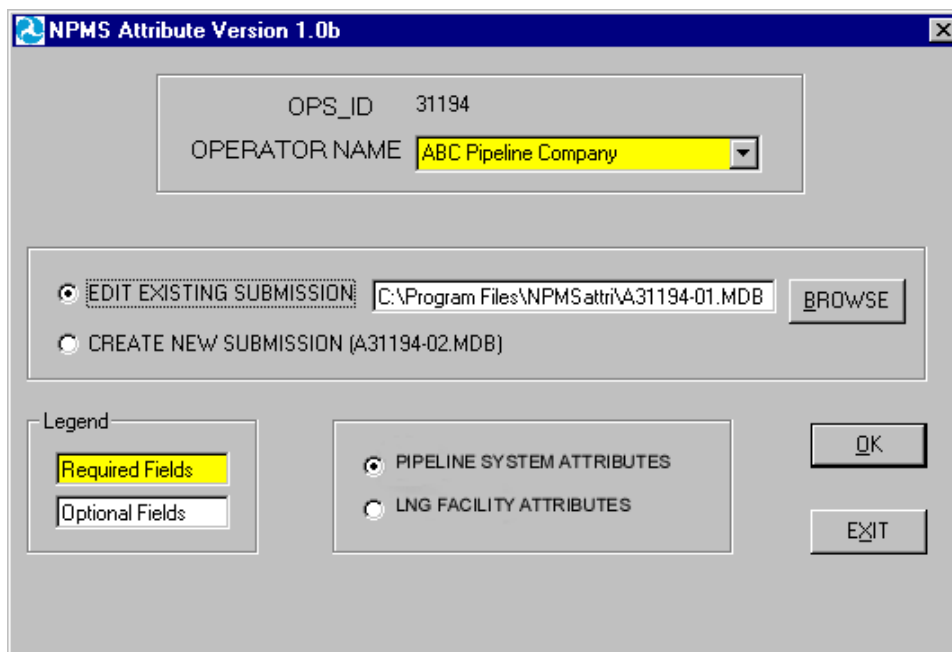
From the Internet:

1. Create a directory on your system's hard drive called "C:\NPMS."
2. Download the file "NPMS.EXE" from the NPMS Web site and copy the file in the C:\NPMS directory.
3. From Windows Explorer double click on NPMS.EXE. (NPMS.EXE is a group of compressed files. Double clicking will cause the file to uncompress.)
4. Double click on C:\NPMS\Setup.exe.
5. Follow the on-screen installation instructions.

3.4.3 Step-by-Step User Instructions

The *NPMS Attribute Data Template* simplifies data entry by minimizing repetition. To use the data template, perform the following steps:

1. **Start-up screen** – From the start menu, click on the NPMS Attribute icon to start the program.



The image shows a Windows-style dialog box titled "NPMS Attribute Version 1.0b". At the top, there are two fields: "OPS_ID" with the value "31194" and "OPERATOR NAME" with a dropdown menu showing "ABC Pipeline Company". Below these is a section with two radio buttons: "EDIT EXISTING SUBMISSION" (selected) and "CREATE NEW SUBMISSION (A31194-02.MDB)". The "EDIT EXISTING SUBMISSION" option has a text box next to it containing the file path "C:\Program Files\NPMS\attr\A31194-01.MDB" and a "BROWSE" button. Below this is a "Legend" section with two buttons: "Required Fields" (highlighted in yellow) and "Optional Fields". To the right of the legend are two radio buttons: "PIPELINE SYSTEM ATTRIBUTES" (selected) and "LNG FACILITY ATTRIBUTES". At the bottom right are "OK" and "EXIT" buttons.

Figure 3-3. Attribute data entry screen.

2. **Complete Screen 1** – Select the correct combination of Operator Name and OPS_ID for your firm. Decide if you want to edit an existing file or start a new file.
3. **Data storage** – NPMS data is stored in the same directory where the software was installed, usually the C:\Program Files\NPMS\ directory.

***Note:** If there is existing data for the operator you have selected and the submission is located in the current working directory, the default table for the chosen operator will appear in the “Browse” box, and “Edit Existing Submission” will be the default choice of action. If you are creating a new submission, select that option and a new table will be created for the operator submission you have chosen.*

4. **Data entry** – Select attribute data entry for either pipeline systems or LNG facilities.

PIPELINE SYSTEM ATTRIBUTES (#1 of 5)

OPERATOR
OPS_ID: 31194
OPERATOR NAME: ABC Pipeline Company

OTHER ATTRIBUTE
☒ INTERSTATE ☐ INTRASTATE

SYSTEM NAME: AR LINE

METADATA FILENAME: M31194-01.MDB

COMMODITY
TYPE 1: LIQUID PETROLEUM GAS
TYPE 2:
TYPE 3:
DESCRIPTION:

PIPELINE SEGMENT ATTRIBUTES

OPER_LINK	PIPELINE ID	SUBSYSTEM NAME	DIAM.	STATUS	DATA QUALITY	REVISION
▶ 345678	4321	AR LINE WEST BRANCH	8	IN SERVICE	GOOD: 301-500 FEET	ADDITION
*						

Legend
☒ Required Fields ☐ Optional Fields

Figure 3-4. Pipeline attributes data entry screen.

If “Pipeline System Attributes” was selected on the initial screen,

5. **Complete information for the pipeline system as a whole.** The upper section contains information that needs to be completed only once for each pipeline system. This includes the system name, information about the commodities transported by the system, the system’s interstate/intrastate status, and the associated metadata file created with the *NPMS Metadata Template*.
6. **Complete information for the associated pipeline segments.** When all the required information in the upper portion has been completed, go to the lower portion of the screen to add information about the individual pipeline segments that comprise the pipeline system. Remember, each pipeline system must have at least one pipeline segment. The lower portion allows the operator to record information about items that may change during the course of the pipeline system, such as PIPELINE_ID (PLINE_ID), SUBSYSTEM NAME (SUBSYS_NM), and DIAMETER. It is expected that when information does not change, values will be repeated for each pipeline segment. **However, OPER_LINK cannot be duplicated. Each pipeline segment must have a unique OPER_LINK value.** To delete a pipeline segment, highlight the row by clicking on the far left side of the grid and press the delete key.
7. **Navigation buttons.** “Previous” and “Next” buttons allow forward and backward movement among previously added pipeline systems. The upper left corner of the form will indicate which system number you are on and how many systems exist. To add a system, click on the “Add” button and fill out the attribute data completely. If, at any time, you wish to cancel your addition, click on the “Cancel” button. You will return to the previous pipeline system, and the addition will not be saved.

8. **Complete data entry.** Upon completion, click on the “Save and Exit” button. A message will indicate that the file has been saved to a .MDB table in the current working directory. This file will be readable by the NPMS Attribute software. If the file is ever moved, keep track of where the file has been moved to and be sure to navigate to the .MDB file using the “Browse” feature on the initial NPMS attribute screen. Once returned to the initial screen, use the “Exit” button to exit the application.

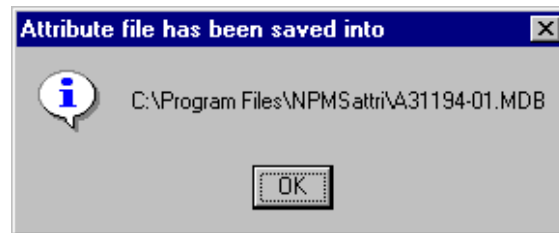


Figure 3-5. Message indicating path and filename of saved file.

If “**LNG Facility Attributes**” was selected on Screen 1,

1. Enter all required data for each LNG facility.
2. “Previous” and “Next” navigation buttons allow forward and backward movement among existing LNG facilities.
3. Use the “Add” button to add an LNG facility.
4. Use the “Cancel” button to cancel an LNG facility addition.
5. Use the “Delete” button to delete an existing LNG facility.
6. Upon completion, click on the “Save and Exit” button. A message will indicate that the file has been saved to a .MDB table in the current working directory. This file is readable by the NPMS attribute software. If the file is ever moved, keep track of where the file has been moved to and be sure to navigate to the .MDB file using the “Browse” feature on the initial NPMS attribute screen. Once returned to the initial screen, use the “Exit” button to exit the application.

The screenshot displays the 'LNG Facility Attribute Data Entry Screen' with the title 'LNG FACILITY ATTRIBUTES (#1 of 2)'. The form is organized into several sections:

- OPERATOR**: Contains 'OPS_ID 31194' and 'OPERATOR NAME 1'.
- IDENTIFICATION**: Contains 'OPERATOR LINK 3125', 'LNG ID TEXARKANA LNG PLANT', and 'LNG NAME TEXARKANA LINE LNG PLANT'.
- CODES**: Contains three dropdown menus: 'STATUS' (IN SERVICE), 'QUALITY' (VERY GOOD: 50-300 FEET), and 'REVISION' (ADDITION).
- OTHER ATTRIBUTE**: Contains 'METADATA FILENAME' (M31194-01.MDB) and a 'Browse' button.
- Legend**: A section with 'Required Fields' and 'Optional Fields' checkboxes.
- Navigation**: A row of buttons including 'PREVIOUS', 'NEXT', 'ADD', 'DELETE', 'CANCEL', and 'SAVE and EXIT'.

Figure 3-6. LNG facility attributes data entry.

4. Geospatial Data (Digital or Hard-Copy Maps)

Geospatial data represent pipeline systems (linear) and LNG facility (point) elements. Pipeline and LNG facility data may be submitted in either digital or hard-copy format. All submissions should meet the ± 500 -foot accuracy standard.

4.1 General Requirements for Digital Geospatial Data

The following discusses various requirements and formats that operators should meet when submitting digital geospatial data.

1. Use a real world coordinate system based on North American Datum (NAD) 1983 or NAD 1927. The Repository accepts unprojected data in decimal degrees and data that employs a common projection scheme such as Universal Transverse Mercator (UTM) or State Plane. Projected data may employ either English (feet) or metric (meters) measurement units. In all cases, clearly state the **datum, coordinate system/ projection, and measurement units** in the accompanying metadata.

***Note:** Digital data that does not employ real world coordinates, such as CAD files that employ an origin point of 0,0 in the lower left hand corner of the drawing cannot be accepted by the Repository.*

2. Provide spatially accurate data. NPMS strives for minimum accuracy of ± 500 feet. Base maps or other source materials used to develop digital geospatial data submissions should have a scale between 1:24,000 (1" = 2,000') and 1:1,200 (1" = 100'). The spatial accuracy of the digital submission should be clearly stated in the accompanying metadata.
3. Always submit pipeline systems (lines) and LNG facilities (points) in separate files.
4. Submit only qualifying pipeline and LNG facility data. The submitted digital file should contain only pipeline segments representing natural gas transmission lines, hazardous liquid trunklines, and points representing LNG facilities. Separate all other data such as gathering lines, spur lines, valves, and base map data such as buildings, roads, property lines, political boundaries, scanned images, etc.

***Note:** Curves should be represented by a pipeline segment with as many vertices/shape points as is required to provide the appropriate cartographic appearance. CAD system arcs should be avoided.*

5. Ensure that the reproduction and submission of any map or data does not violate existing copyright laws.
6. Review data for quality. Common problems include:
 - a. overshoots and undershoots at pipeline intersections,
 - b. stray points and lines that do not represent a pipeline or LNG facilities, often left from deleting non-NPMS data, and/or
 - c. duplicate points and lines.
7. Use commonly accepted digital media. The Repository accepts CD-ROMs, diskettes, zip disks, and Internet transmissions. Check the NPMS Web site for details.

4.2 Digital Submission Techniques

The instructions below provide general assistance to operators using some of the more popular GIS and CAD software packages. Some currently available GIS formats are not discussed, but may be acceptable. Operators interested in submitting data in a format not provided for in these instructions should contact the Repository to determine its acceptability.

The instructions may not correspond to the exact version of the software package the operator is using, nor do they reflect any software customizations that may have been made. Operators who encounter problems are encouraged to contact their software vendor for technical support.

4.2.1 ESRI ArcInfo Format Data Submissions

Data from ESRI's ArcInfo may be submitted to the NPMS in **Export (.E00) format**. The following describes how coverages must be prepared before the data files are constructed to ensure that they are received and processed correctly.

Steps for preparing an Export (.E00) File follow.

1. Isolate the data to be submitted to the NPMS in a separate coverage.
2. Store the coverage as double precision. Use the Arc COPY command with the DOUBLE option to create double-precision coverages.
3. If not already done, use the PROJECTDEFINE command to define the coverage's projection information.
4. If the attribute data are stored in an external Lookup Table (LUT), the NPMS requests that the attribute data be attached to the coverage to lessen the opportunity for data corruption. To attach the LUT files, use the Arc JOINITEM command based on some common identifier.
5. If not already present, create arc topology using the BUILD command for lines.
6. Use the Arc EXPORT command to generate the .E00 file.
7. Submit the .E00 file to the NPMS.

4.2.2 ESRI ArcView Format Data Submissions

Operators may submit data to the NPMS using the shapefile format of ESRI's ArcView desktop software. The following describes how shapefiles must be prepared:

1. Isolate the data to be submitted to the NPMS into a single line (pipeline) or point (LNG facility) theme.
2. Use the "Convert to Shapefile" command on the Theme menu to export the data. This will create three files (.SHP, .SHX, .DBF).
3. Submit all three files, the .SHP (geospatial data file), the .SHX (index file), and the .DBF (attribute data file) for each shape theme to the NPMS.

4.2.3 Intergraph Corporation's FRAMME Data Submissions

Data from an Intergraph AM/FM/GIS system that uses the FRAMME database architecture can be provided to the NPMS in several different formats. However, the two that the Repository prefers are 1) **Microsoft Access** format and 2) **FRAMME Loader SEF** format (a structured ASCII file format). These two approaches are described below.

Microsoft Access Format. Intergraph offers a viewing/analysis product called GeoMedia that allows users to access and perform analysis operations on various GIS databases (including data stored in FRAMME, ArcInfo, ArcView, Oracle Spatial Data Cartridge/Spatial Data Option, MGE, and Microsoft Access). **It can also extract data from any of these databases** and store it in a local Microsoft Access database file format. The process to create this Access file follows:

1. Make a warehouse connection to the GIS database (FRAMME).
2. Create an empty Access database file warehouse using GeoMedia.
3. Define the coordinate system of the Access warehouse as Geographic (Lat/Long) and NAD 83 Datum. Many other coordinate system definitions are also supported.
4. Isolate the data to be submitted to the NPMS. A subset of the GIS data may be identified by means of attribute and/or spatial queries. This will create a named query set.
5. Import data from either the GIS database or from the named query set into the Access warehouse. On import, the data will be transformed from whatever native coordinate system it is stored in to the desired Geographic NAD83 format. The Access file will contain both feature attributes and graphic definitions.

FRAMME Loader SEF Format. FRAMME's normal method of bulk data import and export is a product module called FRAMME Loader. It supports both loading and unloading of ASCII text files. These text files must be in a structured format called Standard Exchange Format (SEF). The SEF file contains both feature attributes and graphic definitions. The basic process to create the SEF file follows.

1. From within FRAMME, isolate the data to be exported using the feature extraction process.
2. Unload the extracted data using FRAMME Loader capabilities.

4.2.4 Intergraph/Bentley Corporation's Microstation and non-FRAMME Data Submissions

Operators may submit geospatial data using Microstation/Intergraph systems. The following procedures have been developed to help operators submit this type of data.

Because it is difficult to attach attribute data to Microstation/Intergraph drawing files, the following tasks must be performed before providing data to the NPMS Repository:

1. Isolate the data to be submitted to the NPMS.
2. Annotate a unique item, OPER_LINK, for each pipeline or LNG facility as a text element in the drawing. The OPER_LINK value must be located adjacent to the pipeline or facility that it identifies.

3. Save the drawing as a .DGN file. Create an attribute data table using the *NPMS Attribute Data Template* software.
4. Enter the OPER_LINK identifier from the drawing and that pipeline's or facility's attribute data into the attribute table.
5. Submit both the .DGN and the attribute table to the NPMS. For the .DGN file, also submit a schema or template for the levels used.
6. Include in the associated metadata any special instructions, such as map units, scale, seed file, font types, etc. that are associated with the .DGN file to help the NPMS process the data.

4.2.5 MapInfo Data Submissions

Operators may submit data to the NPMS using the MapInfo Interchange File (MIF) format of MapInfo Corporation desktop software (Version 3 or higher). The **projection** must be noted: Category, Category Members, and Map Units (coordinate units, distance units, and area units).

1. Isolate the data to be submitted to the NPMS in a separate table.
2. Export the table (Table → export).
3. Submit the MIF, MID, and projection (ASCII format) files for each table to the NPMS.

4.2.6 AutoCAD Data Submissions

Operators may submit geospatial data using AutoCAD systems containing geospatial data. The following procedures have been developed to assist operators in submitting this type of data.

1. Isolate the data to be submitted to the NPMS.
2. Because it is difficult to attach attribute data to CAD drawing files, the following tasks must be performed. Annotate a unique item, OPER_LINK, for each pipeline or LNG facility using either the LAYER or MS-ID field in the AutoCAD drawing.
3. Save the drawing as a Version 12 AutoCAD .DWG file. Ensure that the drawings are saved in "model space" and not in "paper space." In other words, all drawings should be cross-referenced to the appropriate coordinate system before saving.
4. Create an attribute data table using the *NPMS Attribute Data Template* software. Add columns in the table for OPER_LINK and each of the attribute items required by the NPMS.
5. Enter the OPER_LINK identifier from the drawing and that pipeline's or facility's attribute data into the attribute table.
6. Submit both the .DWG and the attribute table to the NPMS. For the .DWG file, also submit a schema or template for the levels used.
7. Include in the associated metadata any special instructions, such as map units, scale, projection information, font types, etc. that are associated with the .DWG file to help the NPMS process the data.

By providing the AutoCAD and attribute data in these formats, the Repository will be able to use the OPER_LINK values to associate the pipeline and LNG facility features with their appropriate attributes.

4.2.7 Smallworld Data Submissions

Operators may submit geospatial data using Smallworld. The following procedures have been developed to assist operators in submitting this type of data. It is important to note that the data must conform to the datum, projection, scale, and control requirements outlined in these standards.

1. Isolate the data (real world objects) to be submitted to the NPMS.
2. Use the FME (Feature Manipulation Engine), an add-on package available from Smallworld or Safe Software Inc., to create an ArcInfo exchange (.E00) file.
3. Submit the .E00 file to the NPMS.

4.2.8 Generic (ASCII) Digital Data Submissions

This type of submission will include a geospatial file containing coordinate data, an attribute file containing information associated with the pipeline(s) or LNG facility(ies), and a metadata file describing the data.

The file formats for pipelines and LNG facilities are different. Both file formats are described below, including record layouts.

Geospatial File for Pipeline Digital Data Submissions. To submit digital data for pipelines, the operator will create files matching the following format. The file format will include the unique identifier (OPER_LINK) on one line, followed by a coordinate pair (longitude and latitude). Additional coordinate pairs will be listed in order of appearance along the line segment until all coordinate pairs are displayed. The final coordinate pair for the line segment is to be followed by the word “END.” “END” designates the end of the coordinate information that comprises a line segment. Each line segment submitted must contain a minimum of two coordinate pairs to represent the beginning and end of a straight line. An additional “END” is required to designate the end of the file.

The unique identifier (OPER_LINK) will link the geospatial location to the attribute information for each pipeline submitted. Header information, as shown in Figure 4-1, should not be included in the submitted file.

DESCRIPTION	ASCII FILE FORMAT
(Do not include this section in your file)	
OPER_LINK	1 5 1
LONGITUDE, LATITUDE PAIR	- 9 4 . 5 7 6 4 1 5 , 3 2 . 9 1 1 6 5 8
LONGITUDE, LATITUDE PAIR	- 9 4 . 5 7 6 4 5 6 , 3 2 . 9 1 2 6 3 9
END OF LINE	END
OPER_LINK	1 5 2
LONGITUDE, LATITUDE PAIR	- 9 4 . 4 5 6 4 1 5 , 3 3 . 0 0 1 6 5 8
LONGITUDE, LATITUDE PAIR	- 9 4 . 4 5 6 7 9 7 , 3 3 . 0 0 0 6 8 1
LONGITUDE, LATITUDE PAIR	- 9 4 . 4 5 7 1 0 8 , 3 3 . 0 0 0 2 8 4
LONGITUDE, LATITUDE PAIR	- 9 4 . 4 5 7 8 0 1 , 3 2 . 9 9 9 9 1 6
END OF LINE	END
OPER_LINK	1 5 3
LONGITUDE, LATITUDE PAIR	- 9 4 . 4 5 7 8 0 1 , 3 2 . 9 9 9 9 1 6
LONGITUDE, LATITUDE PAIR	- 9 4 . 4 5 7 1 5 3 , 3 3 . 0 0 1 4 7 9
LONGITUDE, LATITUDE PAIR	- 9 4 . 4 5 6 8 8 3 , 3 3 . 0 0 2 6 3 9
END OF LINE	END
	.
	.
	.
OPER_LINK	1 5 1 9
LONGITUDE, LATITUDE PAIR	- 9 3 . 5 4 1 2 1 3 , 3 3 . 6 7 4 0 6 8
LONGITUDE, LATITUDE PAIR	- 9 3 . 5 4 1 4 1 6 , 3 3 . 6 7 4 5 9 7
LONGITUDE, LATITUDE PAIR	- 9 3 . 5 4 2 3 8 6 , 3 3 . 6 7 5 4 1 9
LONGITUDE, LATITUDE PAIR	- 9 3 . 5 4 5 6 0 4 , 3 3 . 6 7 7 4 3 7
LONGITUDE, LATITUDE PAIR	- 9 3 . 5 4 6 6 0 9 , 3 3 . 6 7 7 7 8 2
END OF LINE	END
END OF FILE	END

Figure 4-1. Geospatial file containing pipeline information.

Longitude should be stated in decimal degrees (no projection), for every stored pipeline start, shape, and end point. A minimum of five decimal places is required. Western Hemisphere longitude should be a negative value. Acceptable values are -180.00000 to 0.00000. Northern Hemisphere latitude should be a positive value. Acceptable values are 0.00000 to 90.00000.

Geospatial File for LNG Facility Digital Data Submissions. To submit digital data for LNG facilities, the operator will create files matching the following format. The geospatial file for LNG facilities will contain the unique identifier (OPER_LINK) plus the longitude and latitude values on a single line. The unique identifier (OPER_LINK) will link the geospatial location to the attribute information for each LNG facility submitted. The last line in the file must contain only the word “END.” Header information, as shown in Figure 4-2, should not be included in the submitted file.

The location should reflect the approximate geographic center of the LNG facility. If the location depicts something other than the approximate center, note this in Question 3 of the Data Transmittal Form.

OPER LINK				LONGITUDE											LATITUDE											
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
2	0	1	,	-	9	4	.	1	1	5	9	9	7	,	3	3	.	2	5	0	0	0	0			
2	0	2	,	-	9	4	.	3	8	3	0	0	3	,	3	3	.	2	0	0	0	0	1			
2	0	3	,	-	9	3	.	8	6	5	9	9	7	,	3	2	.	8	6	5	9	9	9			
2	0	4	,	-	9	4	.	0	5	0	0	0	3	,	3	2	.	7	8	5	9	3	7			
2	0	5	,	-	9	4	.	5	9	9	9	9	8	,	3	3	.	5	3	6	2	9	4			
END				*** Marks the end of the file.																						

Figure 4-2. Geospatial file containing LNG point information.

4.3 Hard-Copy Submissions

Operators may also submit the location of the pipeline or LNG location data on hard-copy maps. The following sections discuss various requirements and formats that operators should meet when submitting hard-copy geospatial data. All hard-copy submissions should conform to the ± 500 foot accuracy standard.

4.3.1 Pipeline Drafting Requirements

The location of every major gas transmission pipeline and hazardous liquid trunkline (as defined by these standards) must be drafted onto the base map(s). The two options for depicting the pipelines are to

- ◆ designate individual pipelines on the maps or
- ◆ designate pipeline corridors with annotation that provides a unique identifier for each pipeline operating in the right-of-way.

The operator should draft a thin solid line using indelible ink to clearly delineate the location of the pipeline(s) or pipeline corridor. To make the lines readily identifiable for the Repository, the operator should use a marker to highlight the drafted lines. If there are multiple pipelines or pipeline corridors on the same map, the operator should use different colored markers to distinguish them. This will allow the Repository to clearly identify the pipeline(s) drawn and highlighted by the operator from roads and other pipeline systems. The beginning and the end of *pipeline segments*, including *pipeline intersections*, should be marked with a clear, visible dot. See Figure A-1 in Appendix A for an example.

4.3.2 LNG Facility Drafting Requirements

Every active LNG facility must be depicted on a base map(s). The operator should designate the approximate geographic center (within 500 feet) of the LNG facility by drafting a clear, visible square in indelible ink on the map. See Figure A-1 in Appendix A for an example.

4.3.3 Annotating Pipeline and LNG Attribute Data

It is preferred that operators submit pipeline and LNG attribute information using the *NPMS Attribute Data Template* or another acceptable digital format. However, operators submitting hard-copy maps may also annotate the attributes directly onto the map. Each of the required attribute fields listed in Figure 3-1

and Figure 3-2 must be depicted on each map. This depiction must include the field name and the attribute information for that field. See Figures A-2 and A-3 in Appendix A for an example.

To identify pipeline contents, status, operator name, etc., as described in the attribute section, the submitting operator should label the pipelines on each map with the required attribute data. With the exception of PLINE_ID, if the attribute data do not change, the operator needs to label the attributes only once per map. If an operator wants to submit digital attribute data instead of annotating each map, refer to Section 3, Attribute Data.

4.3.4 Requirements for Hard-Copy Mapping

1. **Use appropriate base maps:**
 - a. USGS topographic maps, 7.5 minute/1:24,000 scale (1" = 2000'), are the preferred base maps. Where 1:24,000 scale maps do not exist (e.g., Alaska, Puerto Rico, offshore), the operator should use the largest scale of USGS maps available. The entire quad sheet must be submitted (not cropped) so that all control points and marginalia are included.
 - b. Pipeline inventory and alignment sheets are acceptable only if they have a minimum of four georeferenced control points per sheet and have a scale between 1:24,000 (1" = 2,000') and 1:1,200 (1" = 100'). Operators who are unable to supply this quality of mapping should contact the Repository before proceeding with their submittal. **Map sheets may not be larger than 36" x 48"**. Pipeline inventory and alignment sheets must clearly state the projection parameters, datum, and graphic scale.
 - c. Third-party base maps may be acceptable if they have a scale between 1:24,000 (1" = 2,000') and 1:1,200 (1" = 100') and have a minimum of four georeferenced control points. **Map sheets may not be larger than 36" x 48"**. Third-party maps must include the projection parameters, datum, and graphic scale in order to be acceptable.
2. **Copyright laws.** Ensure that the reproduction and submission of any map or data does not violate existing copyright laws.
3. **Label each pipeline system.** On each map sheet, label each pipeline system at least once. The label reads as follows: SYS_NM = "System Name." The system name should be the name you use to identify the pipeline system being submitted.
4. **Label and mark each pipeline segment.** Each pipeline system is composed of one or more uniquely identified pipeline segments. The operator must clearly label each pipeline segment with a unique alphanumeric code, using the pipeline identifier PLINE_ID. Pipeline segments may cross map sheets – there is no need to create new pipeline segments at sheet boundaries. The beginning and end of each pipeline segment should be marked with a clear, visible dot.

***Note:** If the operator chooses, individual pipeline segments may be used to represent changes in pipeline attributes. For example, pipeline systems may be broken into subsystems (SUBSYS_NM) to better identify the pipeline. The values of some other fields such as DIAMETER may also change during the course of the pipeline system.*
5. **Label and mark each pipeline intersection and corridor.** Each pipeline intersection should be marked with a clear, visible dot. Remember, it is possible for pipeline segments to cross but not

intersect. If many pipelines are grouped together in a corridor, list each PLINE-ID, and label each pipeline as it joins and exits the corridor.

6. **Build a legend in the margin of each map sheet.** The legend must include the operator name, names of the various pipelines systems or corridors on the map sheet, and the color used to highlight each pipeline system or pipeline corridor.
7. **Review for accuracy at sheet edges.** Do pipeline systems sheets match precisely across adjoining map sheets? If not, note the proper alignment on both map sheets. This process is known as edgematching.
8. **Sequential page number.** Number each quad using the page/total pages format (example: “1/34” or “1 of 34”) to ensure inclusion of all map sheets.
9. **Do not use a photocopier to change base map size or scale.** The submitted maps may be original maps or reproductions. However, if submitting a reproduction, the submitted map will not be accepted if the scale has been modified from the original map scale.
10. **Do not submit maps sheets larger than 36" x 48".**
11. **Do not fold maps.** When transmitting maps to a Repository, roll the maps in a tube. This will improve the accuracy of digitizing.

5. Contact Information

Contact information is now required for all pipeline submittals. Each pipeline operator has the choice of picking either an individual (example: “Joe Smith”) or an entity (example: “Public Relations Department”) to be responsible for handling public questions about their pipelines. **Pick one or the other of these options; do not pick both.**

The pipeline operator also has the choice of specifying multiple contacts based on geography or operating units within the company. **Note: if an operator chooses to have more than one contact, they must get in touch with the National Repository before submitting this information.**

Contact information is submitted through the NPMS Web site at www.npms.rspa.dot.gov. When entering contact information, you will see the following screen.

The screenshot shows the 'National Pipeline Mapping System' header with a banner image of a pipeline and a map. Below the header is the 'Operator Contact Information Form'. A note states: 'All fields marked with a * must be filled in before submitting the form.' The form includes the following fields and options:

- Operator ID: ***: A dropdown menu showing 'SP GAS PIPELINE COMPANY'.
- Contact Information:** A section header.
- Please enter the first name, last name and title OR the contact entity fields.**: A choice between individual contact or contact entity.
- First Name:** A text input field.
- Last Name:** A text input field.
- Title:** A text input field.
- OR**: A choice between individual contact or contact entity.
- Contact Entity (For example, "Public Relations Department"):** A text input field.
- Address 1: ***: A text input field.
- Address 2:** A text input field.
- City: ***: A text input field.
- State: *** (Please enter the State Abbreviation. For example: VA): A text input field.
- Zip: ***: A text input field.
- Phone: *** (Do not put spaces or hyphens. For example: 7039608800): A text input field.
- Extension:** A text input field.
- Fax:** (Do not put spaces or hyphens. For example: 7039608800): A text input field.
- Email: ***: A text input field.
- Submit**: A button at the bottom.

Figure 5-1. Operator Contact Information Form.

Most of the information is self-explanatory. You will need to decide whether you are designating an individual or an entity. If you choose an individual, fill in the individual's first name, last name, and title. If you choose an entity, fill in the "Entity Name" field. When finished, click on the Submit button. If you do not fill in the appropriate fields for your choice, you will receive an error message telling you which fields you still need to complete. You will receive a copy of your response at the e-mail address you provided.

If you need to edit your contact information in the future, contact the National Repository at npms-nr@mbakercorp.com.

Figure 5-2 shows attribute information for the Operator Contact Information Form.

Field Name	Field Type ¹	Field Length	Short Description	Full Description	Acceptable Values ² (UPPERCASE)	Required Field ³
OPS_ID	I	5	Operator ID	OPS Operator ID.	Positive Integer	Y
FNAME	C	50	First Name	First name of designated contact person, if applicable.	Character	N*
LNAME	C	50	Last Name	Last name of designated contact person, if applicable.	Character	N*
TITLE	I	50	Title	Title of designated contact person, if applicable.	Character	N*
ENTITY	I	50	Position	Entity name, if applicable.	Character	N*
ADDRESS1	C	50	Address 1	Address, first line.	Character	Y
ADDRESS2	C	50	Address 2	Address, second line.	Character	N
CITY	C	50	City	City.	Character	Y
STATE	C	2	State	Two-letter abbreviation for state.	Character	Y
ZIP	I	5	ZIP Code	Five-digit ZIP code.	Integer	Y
PHONE	C	10	Telephone Number	Daytime telephone number of designated contact.	Character	Y
EXT	C	5	Telephone Extension	Telephone extension of designated contact.	Character	N
FAX	C	10	Fax Number	Fax number of designated contact.	Character	N
EMAIL	C	50	Email Address	Email address of designated contact.	Character	Y

NOTES:

1 I – Integer; C – Character; R – Real Number; D – Date.

2 Field must be UPPERCASE.

3 N – in the "Required Field" column means that the operator does not have to submit data for that field.

* You must choose either A or B from the following: A) FNAME, LNAME, TITLE or B) ENTITY.

Figure 5-2. Attribute field definitions for the Operator Contact Information form.

6. Metadata

Submission of metadata created with the *NPMS Metadata Template* is an NPMS requirement. Metadata is textual information that describes geospatial data. It describes the content, quality, condition, and other characteristics of data. It provides additional background information such as descriptions, source materials, and points of contact.

Metadata must accompany all hard-copy and digital geospatial data submissions sent to the NPMS. The operator will include information regarding the source and the quality of the data submission. The metadata will assist the Repository and the end user of pipeline and LNG facility data. As a general rule, there should be one metadata file created for each pipeline system.

6.1 Background

Metadata was developed to help “insure an organization’s investment in data. As personnel change or time passes, information may be lost and the data may lose their value.”¹ Where metadata is not collected, future staff may not trust the data due to its unknown quality. Metadata also provides information necessary for data transfer. It allows the receiver to process, interpret, and incorporate the data properly with another data set.

Executive Order 12906 requires that each federal agency use the Federal Geographic Data Committee (FGDC) Metadata Standard, “Content Standards for Digital Geospatial Metadata,” to document digital geospatial data that they produce. The FGDC is an interagency committee that promotes the coordinated use, sharing, and dissemination of geospatial data on a national basis. OPS must produce metadata compliant with the FGDC Metadata Standard.

The *FGDC Metadata Standard for Digital Geospatial Metadata* provides a standard format, specifies the requirements for data collection, and establishes a common set of terminology and definitions. The standard is somewhat complex and is composed of mandatory, mandatory if applicable, and optional sections. OPS is collecting only mandatory information or information that is critical to clear understanding of the operator submittal.

6.2 NPMS Metadata Template

To simplify the operator’s metadata submission, OPS has developed *NPMS Metadata Template* software. The software is available at no cost and can be downloaded from the NPMS Web site. The *NPMS Metadata Template* has been customized from for NPMS submissions. Do not use other metadata software. Use of the *NPMS Metadata Template* is required.

6.3 Using the NPMS Metadata Template

The *NPMS Metadata Template* software is available at no cost. The software can be downloaded from the NPMS Web site. It comes in the same software installation package as the *NPMS Attribute Data Template*.

¹ Content Standards for *Digital Geospatial Metadata Workbook*, Version 1.0, March 24, 1995.

6.3.1 System Requirements

The system requirements are a 486 processor (or higher) personal computer that uses Microsoft Windows 95, 98, 2000, or Windows NT. The system should have at least 8 megabytes of RAM and a CD-ROM drive.

6.3.2 Installation Instructions

From CD-ROM:

1. Insert CD-ROM.
2. From Windows Explorer, double click on Setup.exe.
3. Follow the on-screen installation instructions.

From the Internet:

1. Create a directory on your system's hard drive called "C:\NPMS."
2. Download the file "NPMS.EXE" from the NPMS Web site, and copy the file in the C:\NPMS directory.
3. From Windows Explorer, double click on NPMS.EXE. (NPMS.EXE is a group of compressed files. Double clicking will cause the file to uncompress.)
4. Double click on C:\NPMS\Setup.exe.
5. Follow the on-screen installation instruction.

6.3.3 Metadata Entry

Use of the *NPMS Metadata Template* is mandatory. To use the data template, perform the following steps:

1. From the start menu, click on the NPMS Metadata icon to start the program.
2. Complete the start-up screen by entering the OPS_ID and the name of the operating firm, OPER_NM.
3. Follow the on-screen instructions to complete the template.

6.3.4 Metadata Samples

The *NPMS Metadata Template* asks slightly different questions depending on whether digital or hard-copy geospatial data is being submitted. Appendix B offers metadata examples for hard-copy and digital geospatial data submissions, including screen captures.

7. Voluntary Breakout Tank Submissions

OPS accepts **voluntary** data submissions to the NPMS for breakout tanks under OPS jurisdiction. OPS has developed two procedures for submittal. They include an online form and a downloadable executable file that can be used to input the tank data. The operator can choose either option for submission. Both the form and the file are available on the NPMS Web site at www.npms.rspa.dot.gov. If the operator chooses the executable file option, the completed file should be emailed to the National Repository at npms-nr@mbakercorp.com.

To submit online, you will need the following information:

- ◆ RSPA Response Plan Number
- ◆ Tank locations:
- ◆ Projection (UTM, State Plane, or Geographic)
- ◆ Latitude and Longitude
- ◆ Tank ID number
- ◆ Year of Original Construction
- ◆ Nominal Size (bbls*000)
- ◆ Liquid Stored (crude, product)

You may use the online application or the NPMS Tank Data Creation Software to make additions to the database or delete previous submissions.

The Tank Attribute Table is shown in Figure 7-1. It is similar to the NPMS tables used in the collection of pipeline and LNG data.

Standards for Pipelines, Liquefied Natural Gas, and Breakout Tank Farms

Field Name	Field Type ¹	Field Length	Short Description	Full Description	Acceptable Values ² (UPPERCASE)
COMPANY	C	40	Company Name	Name of the company that physically operates the tank or tank farm.	Character
FIRSTNM	C	20	Contact First Name	First name of the person to contact for information regarding the tank or tank farm.	Character
LASTNM	C	20	Contact Last Name	Contact person's title.	Character
TITLE	C	20	Contact Title	Contact person's title.	Character
PHONE	C	20	Phone Number	Primary telephone number for the contact person including area code. Please do not include dashes or parentheses.	Character
FAX	C	20	Facsimile Number	Primary fax number for the contact person including area code. Please do not include dashes or parentheses.	Character
EMAIL	C	40	Email Address	Contact person's email address.	Character
ADDRESS	C	40	Address	Street address of the contact person.	Character
CITY	C	20	City Name	Name of the city or town.	Character
STATE	C	2	State Name	Standard two-letter postal abbreviation for the state.	Character
ZIP	C	10	ZIP Code	Postal ZIP code (+4 if available).	Character
FRP	I	4	RSPA Facility Response Plan Number	Tracking number assigned by RSPA corresponding to the facility response plan (FRP) for the tank/tank farm. The FRP number is usually maintained by the operator's Environmental Health and Safety contact or an operations manager.	Positive Integer
SUBDATE	I	8	Date of Data Submission	Two-number month, two-number day, and four-number year of data submission (i.e. MMDDYYYY).	8-Digit Date
FACNAME	C	40	Facility Name	Assigned by the operator. The operator's name for a functional grouping of tanks (e.g. tank farm, tank hotel, etc.).	Character
FACCITY	C	20	Facility City Name	Name of the city in which the tank/tank farm resides.	Character
FACSTATE	C	2	Facility State Name	Standard two-letter postal abbreviation for the name of the state in which the tank/tank farm resides.	Character
FACOWNR	C	40	Facility Owner	Name of the owner of the tank/tank farm.	Character
TANKID	C	20	Tank ID	Assigned by the operator. This is an identifier for a specific tank within a functional grouping of tanks.	Character
CNSTRYR	I	4	Construction Year	Four-digit year of facility construction (e.g. "1990").	Positive Integer
TANKSIZE	I	3	Size of Tank	Nominal size of the tank (bbls x 000).	Positive Integer

Field Name	Field Type ¹	Field Length	Short Description	Full Description	Acceptable Values ² (UPPERCASE)
CMDTY1	C	3	Primary Commodity Code	Abbreviation for the primary commodity stored in the tank. LNG= liquefied natural gas, CRD= crude oil, G= gasoline, K= kerosene, JF= jet fuel, DF= diesel fuel, HO= heating oil, AA= anhydrous ammonia, CO2= carbon dioxide, HVL= highly volatile liquid, OTH= other.	LNG, CRD, G, K, JF, DF, HO, AA, CO2, HVL, OTH
CMDTY2	C	3	Secondary Commodity Code	Abbreviation for the secondary commodity stored in the tank. LNG= liquefied natural gas, CRD= crude oil, G= gasoline, K= kerosene, JF= jet fuel, DF= diesel fuel, HO= heating oil, AA= anhydrous ammonia, CO2= carbon dioxide, HVL= highly volatile liquid, OTH= other.	LNG, CRD, G, K, JF, DF, HO, AA, CO2, HVL, OTH
CMDTY3	C	3	Tertiary Commodity Code	Abbreviation for the tertiary commodity stored in the tank. LNG= liquefied natural gas, CRD= crude oil, G= gasoline, K= kerosene, JF= jet fuel, DF= diesel fuel, HO= heating oil, AA= anhydrous ammonia, CO2= carbon dioxide, HVL= highly volatile liquid, OTH= other.	LNG, CRD, G, K, JF, DF, HO, AA, CO2, HVL, OTH
LONG_DIR	C	1	Longitudinal Direction	The compass direction of the longitudinal coordinate (e.g. "N").	Character
LONGITUDE	N	9	Longitudinal Coordinate	The longitudinal coordinate in decimal degree format (e.g. ###.#####).	Number with 6 Decimal Places
LAT_DIR	C	1	Latitudinal Direction	The compass direction of the latitudinal coordinate (e.g. "W").	Character
LATITUDE	N	9	Latitudinal Coordinate	The latitudinal coordinate in decimal degree format (e.g. ###.#####).	Number with 6 Decimal Places
SUB_TYPE	C	1	Submission Type	Identifies this tank/tank farm as an A= addition to the NPMS, or D= deletion of a previous submission.	A,M,D

Figure 7-1. Attribute field definitions for breakout tank features.

Operators who maintain one breakout tank will submit the geographical location and attributes for the single tank. If an operator maintains multiple tanks at a given location, the submission will include a geographical location representing the approximate center of the tank farm and attributes for each breakout tank operated at the facility. Data input into either the Internet form or the executable file will conform to the database field types and definitions that are outlined in the attribute table. Operators will be required to provide answers to all questions in order to complete their submission. Figure 7-2 shows a flowchart of the submission process.

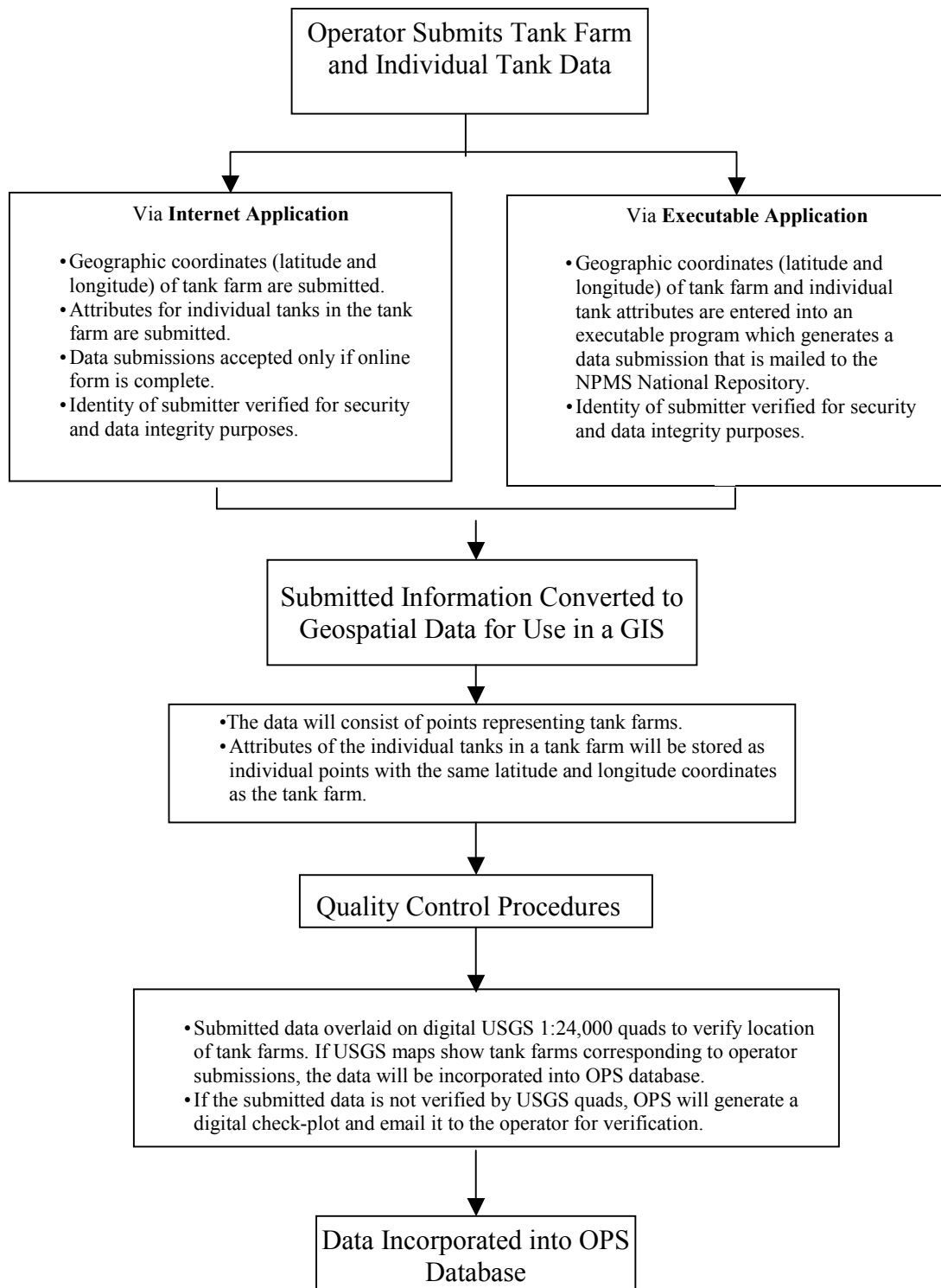


Figure 7-2. OPS tank farm and tank data collection process.

All program related questions should be directed to Steve Fischer (steven.fischer@rspa.dot.gov; 202-366-6267) or Sam Hall (samuel.hall@rspa.dot.gov; 202-493-0591) at OPS. If you have technical questions regarding the use of the online form or the executable file, we recommend you consult the Help system first. If the Help system does not answer your questions, please contact Ron Buzzard at npms-nr@mbakercorp.com or 703-317-6205.

8. Submitting the Data

Operators should use the following checklist to verify that the data being submitted to the NPMS Repository meets the standards and that all necessary information has been included.

8.1 Operator Submission Checklist

8.1.1 Attribute Data Submissions

- ✓ Have all required fields in each feature attribute record been completed?
- ✓ Does each attribute record have a unique link to its line or point element in a geospatial file or on the hard-copy map?
- ✓ Has the attribute data been created and formatted according to the NPMS standard?
- ✓ Does each geospatial element have an attribute record?

8.1.2 Hard-Copy Geospatial Data Submissions

- ✓ Are the maps USGS 1:24,000 topographic quadrangles or other NPMS-approved base maps?
- ✓ Have the maps been checked for scale and accuracy?
- ✓ Have the features been drafted on the map according to the NPMS standard?
- ✓ Have the maps been edgematched?
- ✓ Are the features identified and clearly labeled on the map?
- ✓ Are the features distinguishable from each other on the map?
- ✓ Does each map contain a legend and title identifying operator name and symbology used?

8.1.3 Digital Geospatial Data Submissions

- ✓ Have the features been digitized according to the NPMS standard?
- ✓ Are the linear features continuous without gaps or overshoots?
- ✓ Does each feature have a complete attribute record as defined in the NPMS standard?
- ✓ Has the attribute record been uniquely linked to the point or line feature?
- ✓ Has the submission file been exported and formatted according to the NPMS standard?
- ✓ If the attribute data is in a separate file, has this file been exported according to the NPMS standard?
- ✓ Have the data files being submitted on media been approved by the NPMS?
- ✓ Are the submitted data file names descriptive and unique, following NPMS guidelines?
- ✓ Are all of the geospatial files included in this submission?

8.1.4. Operator Contact Information Submissions

- ✓ Have you chosen either an individual or a general contact name as your contact, but not both?
- ✓ Have you filled in all required sections?

8.1.5 Metadata Submissions

- ✓ Use the *NPMS Metadata Template* software.

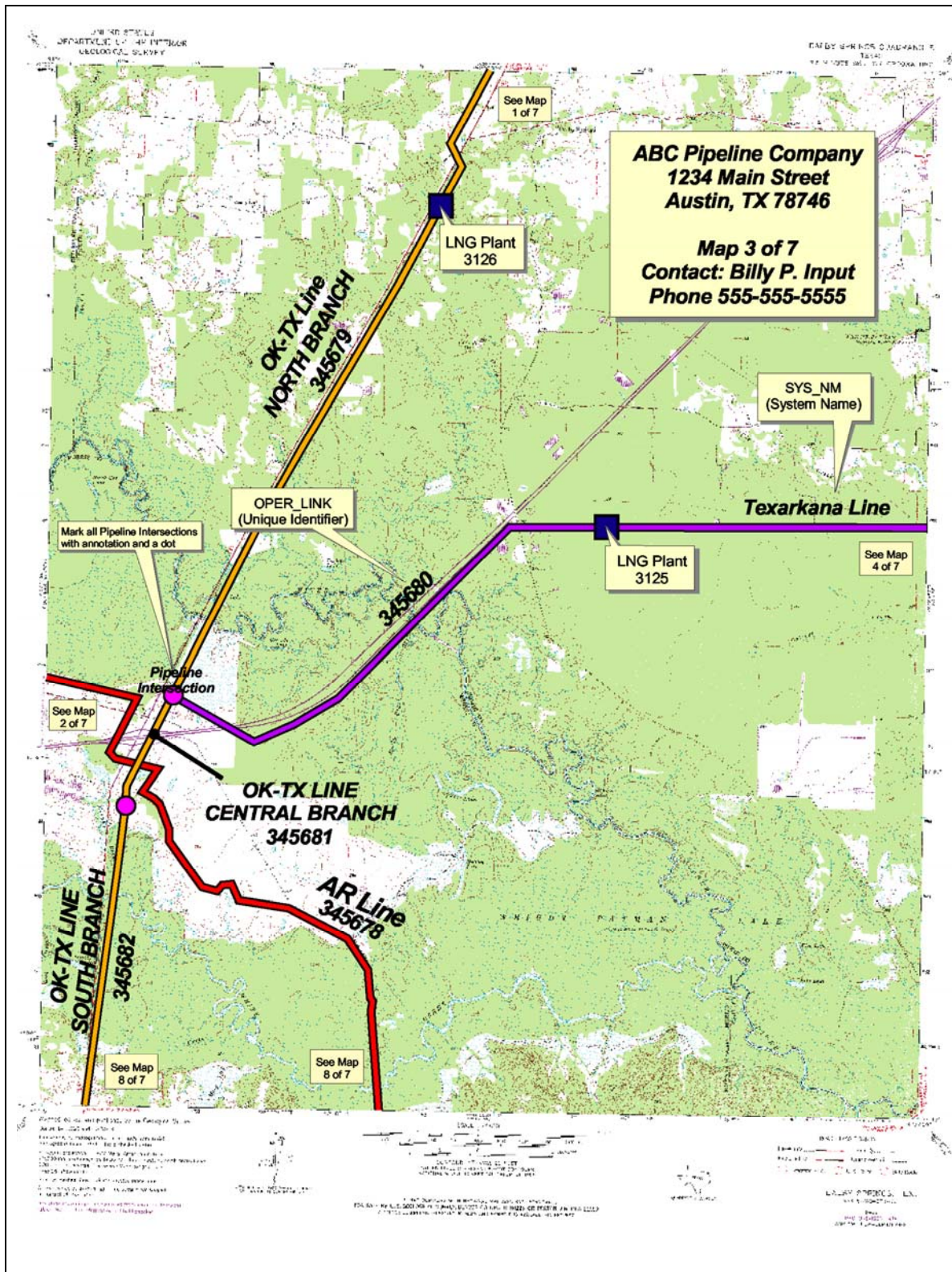
- ✓ Is the contact information current?
- ✓ Has the file name of the digital metadata file been entered into the attribute data records?
- ✓ Are the required sections of the metadata completed?

8.2 Packaging and Sending Data

1. Prepare a cover letter or transmittal form with contact information. Copy all digital file (s) including geospatial data, attribute data, and metadata to an NPMS-approved medium such as diskettes, CD-ROMs, or Iomega zip disks.
2. Roll hard copy maps and send in a tube. Do not send folded maps.
3. Mail submission to the NPMS National Repository.

If you have an all-digital submittal, you may transmit your data electronically. Connect to the NPMS National Repository Web site at www.npms.rspa.dot.gov for details.

Appendix 1 : Sample Hard-Copy Map and Attribute Data



A sample map is shown on the previous page. Provide digital attribute data for each pipeline and LNG facility. These attribute records relate to the hard-copy map.

Pipeline Attribute Table	
<i>Sample Record</i>	
OPER_LINK	345678
OPS_ID	31194
OPER_NM	ABC PIPELINE COMPANY
SYS_NM	AR LINE
SUBSYS_NM	AR LINE WEST BRANCH
PLINE_ID	4321
DIAMETER	8.00
COMMODITY1	LPG
COMMODITY2	
COMMODITY3	
CMDTY_DESC	LIQUIFIED PETROLEUM GAS
INTERSTATE	Y
STATUS_CD	I
QUALITY_CD	G
REVIS_CD	A
META_NAME	M31194-1.MDB

Sample pipeline attribute data.

LNG Facility Attribute Table	
<i>Sample Record</i>	
OPER_LINK	3125
OPS_ID	31194
OPER_NM	ABC PIPELINE COMPANY
LNG_NM	TEXARKANA LINE LNG PLANT
LNG_ID	TEXARKANA LNG PLANT
STATUS_CD	I
QUALITY_CD	V
REVIS_CD	A
META_NAME	M31194-1.MDB

Sample LNG facility attribute data.

Appendix 2: Metadata Example for Geospatial Data Submissions

The NPMS provides free software to help operators create metadata. Use of the software is required. Metadata allows users of NPMS data to understand the history and limitations of information with which they are working. NPMS metadata also serves as the transmittal form for providing essential information that repositories use to process the data.

The *NPMS Metadata Template* creates a Microsoft Access .MDB file. Operators must send the .MDB file to a repository along with the rest of their NPMS submission. The 7-step template is similar to a hard-copy questionnaire. Operators should complete all required information on one screen before proceeding to the next screen. The application saves data automatically as it is entered. The name and location of the .MDB file to be created is established on the initial screen.

Initial Screen. The initial screen requires the user to select the correct OPS_ID for the submitting form. A list of valid operator names and OPS_IDs is provided. If unsure of your firm's OPS_ID, check with your accounting department. If you are unable to locate your OPS_ID, contact Lisa Kokoszaka, OPS Management and Program Analyst, at 202-366-4554. This screen also allows the user to either edit an existing metadata file or to start a new file.

If there is existing data for the operator you have selected and the submission is located in the current working directory, the default table for the chosen operator will appear in the "Browse" box. "Edit Existing Submission" will be the default choice. Data fields shown with a yellow background are required; while data fields shown with a white background are optional.

The screenshot shows the 'NPMS Metadata Version 1.0b' window. At the top, there is a title bar with the application name and standard window controls. Below the title bar, the 'OPS_ID' is set to '31194'. The 'OPERATOR' is set to 'ABC PIPELINE COMPANY' in a dropdown menu. Below this, there are two radio buttons: 'EDIT EXISTING SUBMISSION' (selected) and 'NEW SUBMISSION (M31194-02.MDB)'. The 'EDIT EXISTING SUBMISSION' option has a text box containing 'C:\Program Files\NPMSattri\M31194-01.MD' and a 'BROWSE' button. At the bottom left, there is a 'Legend' section with two buttons: 'Required Fields' (highlighted in yellow) and 'Optional Fields' (white). At the bottom right, there are 'OK' and 'EXIT' buttons.

Step 1. Step 1 collects contact information. Submitting operators must provide name, mailing address, phone number, and, if available, e-mail address of a primary contact, and may provide information for a technical contact. The primary contact must be an employee of the operating company. The technical contact may be a technical employee or an outside contractor. If repository technicians have questions about a submission, they will contact the technical representative first, then the primary representative.

The screen text will change from black to red when your cursor is on that field. Clicking on the “Next” button will advance the operator to Step 2.

Metadata Entry - Step 1 of 7

Operator
OPS_ID 31194
Operator Name ABC Pipeline Company

Primary NPMS Contact

First Name Billy
Last Name Input
Title Pipeline Manager
Company Name ABC pipeline Company
Address 1 1234 Main Street
Address 2
City Austin
State Texas
Zip Code 78746
Work Phone 555-555-5555
Ext 5555
Fax Number
E-Mail binput@abcpline.com

Technical Contact for This submission (Optional)

First Name Joe
Last Name Output
Title Technical Data Manager
Company Name ABC pipeline Company
Address 1 1234 Main Street
Address 2 Austin
City
State Texas
Zip Code 7-8746
Work Phone 555-555-5555
Ext 5555
Fax Number
E-Mail joutput@abcpline.com

Legend
Required Fields Optional Fields

Next >> Save and Exit

Step 2. Step 2 asks questions about geospatial data quality, including positional accuracy. The appearance of subsequent screens will change depending on whether “hard-copy” or “digital” is selected in response to Question 2. Clicking on the “Next” button will advance the operator to Step 3.

Metadata Entry - Step 2 of 7

Operator
OPS_ID 31194
Operator Name ABC PIPELINE COMPANY

Date of Submittal
3/15/99

General Overview Part I

(1) Type of NPMS submittal? If this submittal meets more than one of the categories, please list each submittal separately.

Addition
Spatial Modification
Attribute Modification Only
Metadata Modification Only

(2) Is submitted geospatial data in hard copy or digital format? Digital

(3) Briefly describe the contents of the submission.
7 USGS MAPs with Pipeline and LNG Facility data added.

(4) The submitted pipeline and/or LNG facility data (as distinct from the base map or any other information that may have been included in your submittal) reflects conditions in the field as of. March 1999

(5) The submitted pipeline and/or LNG facility data was last modified on. March 1999

(6a) Have there been any significant changes in the field since the pipeline and/or LNG facility data was last modified? ☐ Yes ☒ No

(6b) If yes, please describe changes that are not reflected in the submittal.

Legend
Required Fields Optional Fields

<< Back Next >> Save and Exit

Step 3. Step 3 continues questions from Step 2. Be sure to enter all required data. Clicking on the “Next” button will advance the operator to Step 4.

Metadata Entry - Step 3 of 7

Operator
DPS_ID 31194
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General Overview Part II

(7) List the state(s) covered by the submitted data (use two-letter postal code, separated by comma). TX, AR

(8) What kind of quality checks were performed on the line/point data? Data was checked against a recent GPS Survey of points along the pipelines and LNG facilities.

(9) The positional accuracy of the pipeline centerline or LNG facility data is within (choose one). 0 to 50 feet

(10) Briefly describe how the positional accuracy value in Question 9 was determined: Horizontal positional accuracy for the data was tested by visual comparison and measurement of the source with hard

Legend

Required Fields Optional Fields

<< Back Next >> Save and Exit

Step 4. Step 4 asks questions about attribute data quality. Attribute file names are also to be listed. The “Browse” feature allows you to select up to five files simultaneously. It automatically fills in the attribute file fields, listing them 1–5, and sends them to the metadata. Clicking on the “Next” button will advance the operator to Step 5.

Metadata Entry - Step 4 of 7

Operator
OPS_ID 31194
Operator Name ABC Pipeline Company
Date of Submittal 3/15/99

Attribute Submittal Questions

(11) What kind of quality checks were performed on the submitted attribute data? Please, describe how the attributes were obtained and checked for correctness and proper linking to spatial data:

Attribute accuracy was checked by manual comparison of the source with hard-copy printouts; routines developed in the mapping system compared attribute values with a list of acceptable values.

If you are submitting digital attributes, also complete questions 12-14.

(12) Was the attribute data included as part of a geospatial digital file; e.g. is it included in an ESRI.E00 file, or a MapInfo .MIF file? ☐ Yes ☒ No

(13) Was the NPMS attribute data template used? ☐ Yes ☒ No

(14) Please list the names of file(s) that contain attribute data:

Attribute file 1 A31194-01.MDB
Attribute file 2
Attribute file 3
Attribute file 4
Attribute file 5

Browse
Clear All File Names

Legend
Required Fields Optional Fields

<< Back Next >> Save and Exit

Step 5. Step 5 collects information on the coordinate system of the submitted data. All submittals must be in real world coordinates. Several lists are provided to assist operators in providing complete and accurate coordinate information. If you cannot find an exact match for your coordinate system, use the space provided by question 18 to include details. Clicking on the “Next” button will advance the operator to Step 6. If the drop-down lists do not provide a suitable response, you can key in an alternate entry.

Metadata Entry - Step 5 of 7

Operator
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Operator Name ABC Pipeline Company

Date of Submittal
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Projection Questions

For the submitted digital geospatial data, please specify the following:

(15) What is the datum of the data? NAD27

(16) What are the measurement units of the data? Feet

(17a) What is the projection of the data ? Universal Transverse

(17b) If state plane, which State Plane zone?

(17c) If UTM, which UTM zone? 96W - 90W

(18) Please, provide any general comments about projection information above.

Same as USGS 7.5 Minute (1:24k) Quadrangle Map.

Legend

Required Fields Optional Fields

<< Back Next >> Save and Exit

Step 6. The content of Step 6 varies depending on whether “hard-copy” or “digital” data was chosen in Step 1 (Question 2). The operator will be presented with questions that relate directly to a hard-copy or a digital submission. If the drop-down lists do not provide a suitable response, you can key in an alternate entry.

Questions asked if submitting hard-copy geospatial data.

The screenshot shows the 'Metadata Entry - Step 6 of 7' window. At the top, there is a header bar with the title and a close button. Below the header, there is a section for 'Operator' information, including 'OPS_ID: 31194', 'Date of Submittal: 3/15/99', and 'Operator Name: ABC Pipeline Company'. The main area is titled 'Hard-copy Submittal Questions'. It contains two questions: (19) 'How many map sheets are being submitted?' with a text input field containing the number '7', and (20) 'What is the scale of the maps?' with a dropdown menu showing '1:24000 (1" = 2000')'. At the bottom, there is a 'Legend' section with 'Required Fields' and 'Optional Fields' buttons, and a '<< Back' button.

The screenshot shows the 'Metadata Entry - Step 6 of 7' window for digital geospatial data submission. It has the same header and operator information as the hard-copy version. The main area is titled 'Digital GeoSpatial Submittal Questions'. It contains several questions with dropdown menus or text input fields: (19) 'What is the primary computer hardware used to create this digital NPMS submission?' (NT Workstation), (20) 'What operating System does that computer use?' (Windows NT), (21a) 'What was the primary software used to create this digital NPMS submission?' (Arc/Info), (21b) 'If "other software", what is the name of the software?' (empty text field), (22) 'What is the version number of the software?' (7.1), (23) 'What is the data format of this digital submission?' (E00), (24) 'What media was used to send this digital submission to NPMS?' (Online), and (25) 'List the names of file(s) that contain the line/point data submission:'. Below question 25, there are five text input fields for 'Geospatial File 1' through 'Geospatial File 5'. The first field contains 'A31194-01.MDB'. There are 'Browse' and 'Clear All FileNames' buttons to the right of these fields. At the bottom, there is a 'Legend' section with 'Required Fields' and 'Optional Fields' buttons, and buttons for '<< Back', 'Next >>', and 'Save and Exit'.

Questions asked if submitting digital geospatial data.

Step 7. The last screen, relates to the source material(s) used to create the submission. This screen is intended to gather information on the base maps and other sources of information used to prepare an NPMS submission. *Note: For this screen, if you have more than one data source, you can create more than one entry.* Additional source material entries can be created by clicking the “Add” button near the bottom of the screen in the “Source Material Navigation” box. “Previous” and “Next” buttons allow forward and backward movement through the source materials when there is more than one. Notice the source material number, shown in the left side of the “Source Material Description” box. The current source material and number of source materials is indicated here. Any source material can be deleted by pressing the “Delete” button. If the dropdown pick lists do not provide a suitable response, you can key an alternate entry. There is no need to submit source material descriptions for individual USGS quad sheets. You can go to the main body of the metadata questionnaire by clicking the “Back to Step 6” button.

This is the final step. When you click the “Save and Exit” button you will be prompted with the name and location of the NPMS metadata file you have created. You will then be taken back to the opening screen where you can start a new file, edit any existing metadata, or exit the program.

Metadata Entry - Step 7 of 7

Operator
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Operator Name ABC PIPELINE COMPANY
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Source Material Description (#1 of 1)

What is the name of the organization(s) that created the source material? ABC Pipeline Surveying Division

What is/are the date(s) of the source material(s)? 1988-1993

What is the source material? Map from rechain survey books.

What is the source material media? Mylar

Briefly describe how the source material was processed and incorporated into the creation or modification of this data set:
The survey books have four georeferenced control points on each sheet. These sheets provided the source for digitizing.

What is the datum of the source material? NAD27

What is the scale of the source material (e.g. 1:24000)? 1:24000 (1" = 2000')

Source Material Navigation
Previous Next Add Delete

Legend
Required Fields Optional Fields

Back to Step 6
Save and Exit

Appendix 3: Glossary

A

Abandoned pipeline	A pipeline that is no longer connected to the system and is no longer maintained. The pipeline can be abandoned in place or by removal.
Accuracy	The degree of conformity with a recognized or established standard.
Accuracy (absolute)	The accuracy of a map in representing the geographic location of an object relative to its true location on the earth's surface. Absolute accuracy is based on geographic coordinates.
Accuracy (relative)	The accuracy of a map in representing the geographic location of an object relative to the locations of other objects.
Alignment sheet	A general-purpose drawing designed to be used by company personnel during the operation and maintenance of the pipeline.
Alphanumeric	Consists of a possible combination of letters, numbers, and punctuation symbols.
Area	A generic term for a bounded, continuous, two-dimensional object that may or may not include its boundary.
ASCII	<u>A</u> merican <u>S</u> tandard <u>C</u> ode for <u>I</u> nformation <u>I</u> nterchange. A popular standard for the exchange of alphanumeric data.
Attribute	A characteristic that helps to describe the data.

B

Base map	A map containing visible surface features and boundaries that is used for local reference.
Breakout tank.....	A tank used to a) relieve surges in a hazardous liquid pipeline system or b) receive and store hazardous liquid transported by a pipeline for reinjection and continued transportation.

C

CAD or CADD	<u>C</u> omputer <u>A</u> ided <u>D</u> rafting (CAD) and <u>D</u> esign (CADD). An automated system for the drafting and display of graphic oriented information.
Control point	A point of known horizontal position used in digitizing paper maps.
Conversion	The process of transforming information from one form to another, e.g., analog (paper) data into digital data.
Coordinates	Pairs of numbers expressing a known horizontal location on the earth's surface.

Crude oil Liquid petroleum out of the ground, as distinguished from refined oils manufactured from crude oil.

D–E

Database Structured collection of data defined for a particular use, user, system, or program; may be sequential, network, hierarchical, relational, or semantic.

Data capture The process of converting hard-copy maps into a digital format.

Data dictionary A listing of each data field and a definition or description of what is contained in that field.

Data set A collection of related data.

Datum (geodetic) The level surface to which elevations are referenced, such as mean sea level. A datum serves as a frame of reference for measuring a location on the surface of the earth.

Digital The discrete numerical representation of data.

Digital centerline A series of connected data elements representing the pipeline.

Digital orthophotos A digital image of an aerial photograph in which the displacement caused by the camera tilt and by terrain has been corrected.

Digitize The process of converting hard-copy manual drawings into digital format.

DLG Digital Line Graphs. Digitized data from USGS base map categories, including transportation, hydrology, elevation contours, and public land survey boundaries.

DXF Drawing eXchange Format. A graphic file and data interchange standard.

F

Facilities Components of the pipeline system, such as the pipe, valves, and compressor stations.

FGDC Federal Geographic Data Committee. Established through OMB and charged with coordinating the development, use, sharing, and dissemination of geographic data.

G

Geodetic control Surveying and monumental points on the earth's surface whose location is established in accordance with national standards.

Geographic	Referring to coordinate systems, latitude/longitude or comparable geographic grid location reference.
Geospatial data	Information that identifies the geographic location and characteristics of natural or constructed features and boundaries on the earth.
GIS	<u>G</u> eographic <u>I</u> nformation <u>S</u> ystem. Computer hardware, software, and geographic data used to capture, store, update, maintain, analyze, and display graphically referenced information.
GPS	<u>G</u> lobal <u>P</u> ositioning <u>S</u> ystem. Survey instrument/process using satellite-generated timing data to establish either ground or aerial coordinates.
Graphic element	Points, lines, arcs, symbols, etc., which can be displayed.

H

Hardware	The physical components of a computer system or network such as the computer, printer, plotter, and terminal.
Hazardous liquid	Petroleum, petroleum products, or anhydrous ammonia.
Hazardous liquid trunkline	A hazardous liquid transmission pipeline other than a flow line, gathering line, or in-plant pipeline.
Highly volatile liquid (HVL)	A hazardous liquid that will form a vapor cloud when released to the atmosphere and has a vapor pressure exceeding 276 kPa (40 psia) at 37.8° C (100° F). Note: natural gas liquids are also HVLs.

I-K

In-service pipeline	A pipeline that transports natural gas or hazardous liquid, or is not currently transporting products but is maintained and can be brought back into service.
Interstate pipeline	A pipeline or part of a pipeline that is used in the transportation of natural gas, hazardous liquid, or carbon dioxide in interstate or foreign commerce across state boundaries.

L

Latitude	Distance measured north or south of the equator.
Liquefied Natural Gas (LNG)	Natural gas or synthetic gas having methane as its major constituent that has been changed to a liquid or semi solid.
Liquefied Petroleum Gas (LPG)	Butane and propane separated from natural gasoline and sold in liquid form as fuel. Also known as bottled gas and tank gas.
LNG facility	A pipeline facility that is used for 1) liquefying or solidifying natural gas, or 2) transferring, storing, or vaporizing liquefied natural gas.
Longitude	Distance measured east or west from the Prime Meridian in Greenwich, England.

M

Media	The physical devices used to record, store, or transmit data, i.e. CD-ROM, diskette, cartridge, tape.
Metadata	Descriptive information about data, such as the timeliness of the data, attribute sources, and accuracy of the data.
MQAT	Joint Government-Industry Pipeline Mapping Quality Action Team. Sponsored by OPS, API, and AGA/INGAA.

N

NAD 27, 83	North American Datum (of 1927 or 1983). Two mathematical representations of the earth's surface.
Natural gas liquid	Also referred to as NGL. Can be ethane, butane, propane, or a propane-butane mix.
Natural gas transmission line	A pipeline system, other than a gathering line, that 1) Transports gas from a gathering line or storage facility to a distribution center, storage facility, or

large-volume customer that is not downstream from a distribution center. A large-volume customer may receive similar volumes of gas as a distribution center, and includes factories, power plants, and institutional users of gas, 2) Operates at a hoop stress of 20 percent or more of specified minimum yield strength (SMYS), or 3) Transports gas within a storage field.

Nominal diameter A dimensionless designator of pipe that indicates the standard pipe size.

O

Offshore pipeline A major natural gas transmission line or hazardous liquid trunkline on the outer continental shelf that begins where production ends and transportation begins. For example, in state waters, a pipeline begins downstream of the outlet flange of each facility where either hydrocarbons are produced or where produced hydrocarbons are first separated, dehydrated, or otherwise processed – whichever facility is farther downstream.

One-Call Service to notify underground utilities of planned excavations.

Operator A person or firm who operates a pipeline system and engages in the transportation of gas or hazardous liquid. The operator may or may not also be the owner of the pipeline system.

Orthophoto Photo with camera tilt and relief displacements removed, resulting in a scale-correct image.

Overlay Simultaneously viewing two or more digital data sets of similar geographic areas.

P

Petroleum..... Crude oil, condensate, natural gasoline, natural gas liquids, and liquefied petroleum gas.

Petroleum product..... Flammable, toxic, or corrosive products obtained from distilling and processing crude oil, unfinished oils, natural gas liquids, blend stocks, and other miscellaneous hydrocarbon compounds.

Pipeline corridor A linear area where two or more pipelines (either part of the same or different pipeline systems) are closely grouped in a single right-of-way. Pipeline corridors pose a cartographic challenge, and NPMS handles them differently on hard-copy and digital maps. On hard-copy maps, a single line with multiple annotations may represent pipeline corridors. In digital files, multiple lines are required, and operators should separate them into individual layers or files.

Pipeline crossing A point where two or more pipelines cross, but where there is no physical connection between the pipelines. Pipeline segments should not be broken at pipeline crossings.

Pipeline intersection	A point where a physical connection between two pipelines occurs. A commodity from one pipeline can flow into another pipeline(s), either a branch within a pipeline system or a connection between two pipeline systems.
Pipeline segment	A linear feature representing part or all of a pipeline system on a digital or hard-copy map. A pipeline segment must have only two ends. No branches are allowed. A pipeline segment may be a straight line or may have any number of vertices. Each pipeline segment must be uniquely identified. The number of pipeline segments should be kept to the minimum needed to represent a pipeline system and its associated attributes. When submitting hard-copy maps, the beginning and ending points of each pipeline segment should be marked with a clear, visible dot. When submitting digital geospatial data, a unique line segment in the computer-aided drafting (CAD) or GIS data set should represent each pipeline segment.
Pipeline system	All parts of a major natural gas transmission line or hazardous liquid trunkline through which gas or hazardous liquid is transported. By definition, only one firm can operate a pipeline system. Operators should assign unique names to each of their pipeline systems. A pipeline system may have an unlimited number of branches. Each pipeline system must be represented by one or more pipeline segments.

Q

Quadrangles (Quads)	Typically refers to the USGS map sheets in the 7.5-minute quad series or the 15-minute quad series. Also known as topographic maps.
Quality	An essential or distinguishing characteristic needed for cartographic data to be fit for use.

R

Repository	The entity designated to maintain, store, and warehouse NPMS data.
Retired pipeline	A pipeline that is still connected to the system but has been taken out of service and is no longer maintained. The operator plans to abandon the pipeline and is waiting for approval.
ROW	<u>Right-of-Way</u> . A section of land designated for use by one or more pipelines. The NPMS refers to ROWs as pipeline corridors.

S

Scale (large)	Small map area showing greater detail, e.g., 1:2,400 = 1" to 200'.
Scale (small)	Large map area with less detail, e.g., 1:100,000 = 1" to 8333'.
Spatial data	Data about the location of objects and their relationship with one another.

T-Z

Thematic	The depiction of particular features or concepts.
Topographic maps	Map showing horizontal and vertical contours, or lines of equal surface elevation.
Topography	Shape of configuration of the land surface. Represented by contour lines in map form.
Topology	Description of the geographic relationship of features, especially features that are adjacent to or connected to another feature.
Vector	Data composed of individual coordinate points and lines whose endpoints are defined by coordinate pairs.